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Production

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GOVERNMENT COMPUTING

ROYAL NAVAL ENGINEERING COLLEGE MANADON, PLYMOUTH

A Minicomputer System is required by the Royal Naval Engineering College, Plymouth, to provide the Control Section with a means of investigating real-time control strategies, and to support their CAD activities. The system will be of the single user, single job type, comprising CPU, memory, backing store and communications facility. Software required: FORTRAN, CORAL (desirable), System Utilities. Installation is required around July, 1979.

Applications for Operational Requirement quoting CEH/28, should be made to:

CENTRAL COMPUTER AGENCY, ROOM 822 RIVERWALK HOUSE, 157-161 MILLBANK LONDON SW1P 4RT

Proposals must be received by 23 March, 1979.

STRIKES, secondary picketing and the conversion of Leicester Square into a giant rubbish tip may dominate the news, but underlying our current concerns are other equally intractable problems which threaten our economic wellbeing and ultimately our way of life.

One of these which is particularly worrying, because it is an outward and visible sign of the structural weakness of the British economy, is the erosion of the industrial base on which, ultimately, all our fortunes depend.

Britain is, in an unacceptable degree, reliant upon the big battalions — the GECs, the ICI, even the British Leylands of this world — to generate its wealth. Indeed, the degree of concentration is such that, in manufacturing industry, 100 firms control over 70% of output.

Over the last ten years the small business sector has been subjected to a process of attrition through takeovers, bankruptcies and a low level of activity in the formation of new businesses.

The withering away of the smaller business sector has been an important contributory factor to our poor industrial innovation record. Other countries such as the US, Japan, France and West Germany are proving more effective in bringing new

A technological platform for new companies

processes into operation and new products into the marketplace even if, in some instances, they are spending less on R&D than we in Britain.

The nature of this unhappy situation and some of the reasons for it are examined in a report, *Industrial Innovation*, from the Advisory Council for Applied Research and Development, which sets out the forms that industrial innovation may take and identifies some of the reasons for our poor performance.

In a paper submitted to the Wilson Committee on the workings of the City, quoted in the ACARD report, the Institutionalisation of our society is seen as one of the main causes of the stifling of new companies and new ideas.

This process has put investment decisions into fewer and fewer hands with a consequent increase in the risk which each decision-maker is faced. Linked with this is the fact that those in financial institutions who are making investment decisions lack any intuitive sense of the kind of new business which might succeed.

Finally, and perhaps most significantly, financial backing for individual innovators has virtually disappeared in Britain, despite the fact that almost every successful innovation from zip fasteners to xerography has initially been the work of a single man.

The outlook seems bleak, but the means of breaking out of this spiral down to teeth class power status could be at hand.

Without descending to Mr Callaghan's euphoria which sees Britain as the "Silicon Valley" of Europe, it is at least arguable

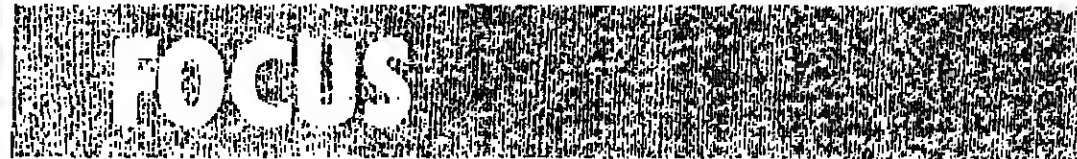
that microelectronics in general and the microprocessor in particular, could widen our industrial base and encourage innovation by providing the technological platform on which new companies could base their business.

However, such new technology based firms will only be set up if conditions are favourable. The ACARD report identifies some of the factors which have favoured their creation in the US and high among these is beneficial tax regulations which would allow sufficient reward for investments, recognising the high risk of technological enterprise.

That is the easy part. Also necessary is an attitude in society which encourages entrepreneurship and improved methods of making finance available to new enterprises.

The government has shown that it is aware of these facts and that it appreciates the importance of microelectronics. What it must now demonstrate is that it is equally aware of the importance of the investor and the entrepreneur if we are again to achieve a reasonable level of industrial innovation in Britain.

Industrial Innovation is published for the Cabinet Office by HMSO, £1.



Motivating the DP team

MOTIVATION, we are frequently told, is the key to all DP problems. Unfortunately it takes more than a motivational key to turn on the average DP professional.

Just what motivates the DP team is far from clear. Certainly current salary levels are seldom the main criterion. Neither are such motivational factors as responsibility, working conditions or job security. Key points are more likely to include career opportunities, job satisfaction and performance.

As a result, DPMs face a confusing and difficult motivational course. This is especially true in the case of the well paid DP analyst. Motivation in this area is less likely to be financial as general purpose. The dangling carrot could be a promise by the DPM for a place on the next

available communication workshop, a visit to a European subsidiary or an invitation to the forthcoming user groupave-up.

Programmer motivation is equally diffuse. Incentives are most likely to be the promise of relief from patching and maintenance to that of an assurance of close involvement in the next new application project.

Motivating the operation team likewise calls for a degree of subtlety. That additional workload is best achieved by a combination of guile and cunning. Bribes are definitely not the solution. The correct action will be amending shift or rotating home, approving an article in *Bernard Allen's Computer Weekly* Op Spot page or resetting the installation coffee machine.

Only in the case of data prep does basic motivation feature. Special productivity payments work wonders for both morale and bank balances.

For the DPM, however, motivation extends beyond the confines of the DP team. The elite engineer requires considerable doses of motivation and encouragement. This can be administered either by the manager of the service department following extensive prodding by the ops manager, or more directly from the installation itself.

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1984 and all that

THIS week's examples of the funny things people say in the media about computers were sent in by John Hoffmann of Wilmshurst, and Helena McCloskey of Penarth, who each win £5.

A hospital authority's offer to pay nurses and other staff a week early has been refused — because of a computer. The pay slips went out — and the computer had sent no money to back up the cheque. Only to find the hospital spokesman said: "Several thousand employees could be affected altogether, but we won't know before Monday. We tried to help, but the computer ruined it."

Sunday Mirror

Hundreds of South Glamorgan teenagers may be able to find the right job more quickly in future — thanks to a £88,000 computer scheme. . . . The system is based on an unimpressive computer called ICI 2800 and county education chiefs hope it can do for jobs like teenagers what Artco-Detec did for Star Wars audiences.

South Wales Echo

Ten years ago...

COMPUTER WEEKLY FEBRUARY 13, 1969

LONDON University installed the UK's second COC 880 to become the most powerful machine at a British university. It will be connected by cable data links to eight of the university's colleges . . . In a bid to become a powerful force in the world computer market, Xerox offered £380 million for Scientific Data Systems of California . . . Two billion dollars sales were recorded by IBM World Trade in 1968 and, according to vice-president Billy Christensen, this represented one third of IBM's sales . . . As a successor to its Line-8 range, Original Equipment launched the POP-12, aimed at the laboratory market . . . The use of integrated circuits enabled Digital Equipment to cut the price of its communication controller.

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PAT COEN . . . the giants do not show they really understand what is needed.

PAT COEN OF LOGICA VTS TALKS TO RORY JOHNSTON

How Nexos can beat the giants

PROSPECTS are good for Nexos, the National Enterprise Board's latest venture, to flourish and take an important slice of the office system market, even in competition with the giant multinationals. That is the view of Pat Coen, chairman of Logica VTS, the NEB's first associate company in this field, who spoke to *Computer Weekly* shortly after the joint announcement of the two new companies by the NEB and Logica (CW, February 1). The first job of Nexos will be to take on the marketing of VTS 100, Logica's stand-alone word processor.

In reply to the much-raised question of how Nexos with its £40 million could hope to compete with IBM and Xerox, who were spending billions on R&D in the office systems area, Coen replied that a small new company had many advantages over the giants.

It had no obsolete base of equipment that new developments had to fit into (a reference to the many thousands of IBM magnetic card typewriters still in use). It could move quickly, with no involved political fights over who was in control and where development would be carried out (a dig at Xerox particularly). It had no vested interest in selling other equipment, such as mainframes or telephone exchanges.

In saying this, Coen echoed the views of Muir Muffat, newly-appointed managing director of Nexos, who said at the launch that this association of firms, with its formal, clearly defined relationships, could well work better than integrated companies in which the parts did not talk to each other.

The principal rationale behind the establishment of Nexos, Coen said, was that the office systems area would become of enormous importance in the world economy, and therefore the UK must contribute added value in this field for the sake of its own prosperity.

A crucial area will be the definition of an integrated architecture for office systems, which will allow all the different pieces of kit in an office to interact with each other and yet will be open-ended, to allow for new developments.

Nexos will be setting up a development group, including representatives of its member

companies, to do this, and to specify a wide range of products which fit into the architecture. Recruitment of the highly-experienced people needed for this group will be one of Muir Muffat's most critical tasks.

Initial products are expected to include facsimile, store-and-forward voice, voice recognition, graphics output, and software for information retrieval. Further member companies in addition to Logica VTS are expected to be announced within a few months.

IBM and Xerox have been working on designing such architectures for years, but Pat Coen is confident that Nexos's will not be swamped by the weight of the opposition. "The major companies do not show a deep understanding of what is needed," he said. He assumed that different architectures would operate at the same time in different installations.

Standardisation, though, is a major problem in Coen's eyes. There is still no standard for exchanging files between word processors, and Coen sees this as a major problem in the development of useful office systems.

There were three degrees of standardisation, Coen said, and they should be dealt with in order: exchanging media (floppy discs and the like); exchanging files (this was difficult because data formats used by sophisticated word processors were very complicated, delineating moveable areas of text, fixed areas, tables, special character sets, and so on); and finally, exchanging staff.

This last involves a standard user interface so that operators did not have to be retrained. Coen saw this, regrettably, as not really practical. System designers had very strong and opposing views on user interfaces, as a survey of the market had shown.

Asked how successful capitalists like Logica felt about taking on government backing, Coen replied that he saw the NEB as a very adventurous, very well-informed merchant bank, considerably readier to get involved in this sort of operation than those in the City.

He disagreed with Tory MP Michael Grynlls' view that the money should be given direct to existing firms such as Logica. The setting up of the marketing and support organisation would be very expensive, Coen said, and Logica did not have the broad-based experience in fields such as fax and voice communications that were required.

"The burgeoning problem facing every office system supplier, that of union opposition, come up."

How did one convince the workers of the wisdom of management's proposals?

"If I could answer that," replied Coen, "I'd be out sorting out all Jim Callaghan's problems." He emphasised, though, that the great majority of girls using word processors were happier and more satisfied than they had been with typewriters.

Attached Processor boosts internal power of IBM 3033

A MEANS of checking out a new release of MVS under VM/370 and then transferring the production workload to it without shutting the machine down is a feature of the new Attached Processor version of the IBM 3033 (CW, February 1).

The two processors, each with its own 64K byte cache memory, share all the main memory, and the attached processor also uses the channels of the host. The 3033AP system can be operated either under MVS in tightly coupled processor mode with a single copy of the operating system, or under VM/370; optional systems extensions are available for both operating systems.

IBM calls the new facility dynamic transition facility, and it is only available on the 3033AP at present; deliveries begin in April 1980. After the new release of MVS has been checked out, all new jobs can be submitted to it, while the old release completes all the current jobs.

The old MVS virtual machine is then shut down, and VM can then be removed, allowing the new release to take over as the native operating system, without affecting jobs then running, or MVS teleprocessing networks. The process is analogous to removing the tablecloth without disturbing the cruetery.

The 3033AP can have four, eight, 12 or 16 Megabytes of main memory, 12 or 16 channels, two consoles and a multiprocessor needs a 3008 multiprocessor communication unit costing £3,517, or £130 a month, for upgrade to 3033AP.

Priced at £3,077,479 or £25,194 a month with 4 Megabytes of main memory and 12 channels, the 3033AP provides up to 70 per cent better internal performance than a uniprocessor running the same job mix. The gain in throughput will depend on how input-output bound the workload happens to be.

Following the retirement of Lord Cromer from the chairmanship and board of IBM UK, managing director Eddie Nixon has been elected chairman, in addition to his present post. Lord Cromer continues as a director of IBM World Trade Europe/Middle East/Africa Corp, and will act as advisor to the UK board.

Multiplexer based on Motorola micro

THE latest model in the range of time division multiplexers made by Timeplex in the US and marketed outside the US by Racal Milgo is a four- or eight-channel statistical multiplexer based on a Motorola 6802 microprocessor.

Called the Microplexer M8, it will link asynchronous data sources transmitting at up to 2,400 bps to a single synchronous data line transmitting at 1,200, 2,400, 4,800 or 9,600 bps. An additional supervisory channel can be used to gain performance statistics or communicate with any channel.

Operation relies on the fact that terminals usually transmit and receive data in small bursts, so that the 128-byte buffers on each input and on the Automatic Retransmit on request error control section should normally provide enough delay to wait until the output line is free, if two or more terminals transmit at once.

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PERIPHERALS 79 will gather together the very best in computer peripherals from renowned manufacturers throughout the world. Most of the United Kingdom's leading suppliers will be exhibiting at the Show and include:

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PERIPHERALS 79 will take place on 13th and 14th March and the opening hours are from 10a.m. to 6p.m. on the 13th and from 10a.m. to 5p.m. on the 14th. Entry is free by ticket (obtainable from the exhibitors or from the organisers). Tickets will also be available from the reception desk at the Exhibition on production of the completed form below.

The West Centre Hotel is situated in Little Road, London SW6 1UO. The A4/M4 passes close to the Hotel and West Brompton and Earl Court underground stations are in close proximity. Buses 30, 74 and 748 pass the Hotel and from Hyde Park Corner.

PERIPHERALS 79 is Sponsored by the Peripheral Suppliers Association.

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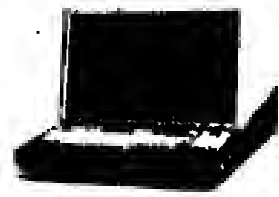
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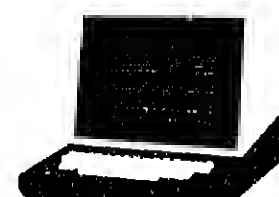
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GILB'S MYTHODOLOGY

Making your program more human



WOULD you like to increase the quality controls on input data in your application? Are you willing to spend some secondary storage space, and system development time to do so?

The concept I am suggesting will not work on every application, but if you are willing and able to adapt it imaginatively to your applications, I would think you will find many uses for it.

We have called this technique pattern checking. In a nutshell, pattern checking is simply a programmed version of what human clerks and input data observers traditionally did, before data processing eliminated the human checking factor, and instituted poorer controls, due to electromechanical limitations initially, then due to tradition.

The human observer registers certain regular patterns of numbers over an extended period, and reacts, at least with a second thought, to unusual variations in such patterns. Indeed such pattern checking is quite common in intelligence tests.

Imagine if you are shopping in Marks and Spencer and see the following series of prices: 9.99, 7.99, 3.99, 14.99, for the first 50 or so prices you noticed on the clothes displayed.

Then imagine what you would think if a sales clerk quoted you a price as "nine." You might want to check that you had heard properly. Maybe it was only the last digit you heard.

Certainly the amount is inconsistent with the marketing illusion the shop is trying to create. It is not necessarily wrong, but you would be wise to check it.

Now let me suggest a way of implementing similar logic in a flexible and work-saving manner.

The amount we want to check could be a quantity or an amount of money, for example. Let me illustrate the principle with an order quantity. If we observe our application we may find that some of our products are ordered in typical quantities such as even numbers, dozens, multiples of ten, multiples of one or mere package groupings or some other pattern. You might observe this informally in an hour of your own time, or you might like to do a statistical tabulation based on a month's order entry logs, using a simple computer program.

You should, if the result is encouraging in the sense that there are many common patterns (don't worry about the exceptions) then allocate a number of additional fields in each product record. The first field contains one or more codes for the probable pattern. For example: T=TENS, D=DOZENS, E=EVEN, P=PACKAGE, ?=NOT YET ESTABLISHED, A=ANY, =DECIMALS. Single codes could be given for common combinations, or several characters could be allocated in the record. The pattern could initially be set to "P" and a one time analysis, automatically made on recent order data sorted by product identification, could establish a possible frequent pattern.

Whenever an order quantity breaks with a pattern, the operator could be asked, if online, to verify it, if offline, a suspected error list might be printed for double checking. If the online operator confirms the quantity we might add "one" to a second extra field in the product record. This will give us a measure of how often the pattern causes us unnecessarily to confirm a correct entry. If, however, the operator changes the entry, we should

add "one" to a third extra field in each product record. This gives us a count of the errors which this particular pattern with this particular product has helped us to catch.

These two extra fields allow us to estimate the value both of particular patterns, so we can adjust and change those that are ineffective. They also allow us to estimate the net value of this set of controls in our particular environment. If it doesn't pay off, we should drop it, but if it does pay off we should teach it to others and look for additional applications for the principle. Note that this method is not the only check used.

It has been particularly difficult to find documentation of variations of this principle — both with regard to the use it is put and the actual results achieved (it is even rarer to instrument the system as we have suggested here) so I would be particularly interested in receiving reports from readers, whether in the form of a letter for publication or a private communication so that I can share the results with others.

Latest release of IMSL Fortran subroutine library

FURTHER support for minicomputer users is the main feature of the latest release of the IMSL Fortran subroutine library. With Edition 7, to be released this month, the minicomputer libraries, which were previously subsets of the library, will contain the full set of 458 routines.

Free form input for Mark IV

FASTER program development is the chief benefit claimed by Informatics for a facility newly available to Mark IV DOS users, namely free form input. With the facility, all the entries normally associated with Mark IV fixed format can be made online at a terminal. It also allows users to take advantage of online DOS text editors. Free form input is already available to OS users for Mark IV.

Dutch subsidiary

A SUBSIDIARY in Holland has been set up by Leasco software in conjunction with Storkdata, the computer services subsidiary of the Vmf-Stork group. The new company, S+L Data Systems, will offer services ranging from consultancy, through turnkey systems, to the sale of software packages.

Puzzler

THIS week's problem is contributed by A.J. Savage, of London NW6. As every accountant should know, the numerical difference created by inadvertently reversing a pair of digits is always divisible by 9, e.g. 36,267 transposed to 32,667 gives a difference of 3,600, which equals 400. What type of error creates a numerical difference that is always divisible by 91? See page 81 for solution.

COMPUTER NOTES

Code efficiency of assembler ensures its continued use

DESPITE the cornucopia flood of high level languages for microprocessors — and great leaps forward in memory size — the code efficiency possible with assembler will ensure its continued use for many applications for the foreseeable future.

Users, for example in process control, will thus continue to pay the typical penalties of assembler level programming, including slower development, more difficult maintenance, and a lower level of confidence in the finished software.

However, as highlighted in the recent correspondence on Basic, there is a fundamental distinction between a language and the software environment which typically supports it.

Both programmer productivity and software reliability can be dramatically improved by such aids as interpreters and interactive debugging tools. As was pointed out in the correspondence, such facilities are intrinsic to some languages and very common in others, but in theory be implemented for any language. Whether or not they are is often explained by the history of its development and use. Assembler, traditionally associated with the higher levels of programming expertise, has in the past generally enjoyed only minimal environmental support. Recently though, the needs of microprocessor users have spurred on the development of sophisticated assembler development systems.

One of the most interesting of

these is the MicroSim system jointly developed by Pacesoft and the London consultancy D.H. England.

MicroSim appears to be the use of an interpreter. As each line of assembler is typed in, the system checks it for syntax errors and assembles it into machine code. If there is an error, it is reported at once to the user, who can correct it before continuing.

As part of the check, MicroSim at the same time resolves internal and external references. Forward label references are entered in an address list for future completion, while calls to an as yet non-existent segment result in the system automatically creating it. There is no formal linking step.

Some of the most powerful facilities are those for testing and are feasible because MicroSim is a simulation system running on a host computer rather than on the target micro.

One such facility is based on a design concept called segmentation. Each program word is labelled with a bit indicating its content: data, instruction, or address. During testing on the host, attempted type violations are trapped and reported. The system is also notable for permitting full symbolic debugging in conjunction with English diagnostics.

The overall effect is to speed up the development of programs dramatically. Typical reports a productivity gain between 300 and 400%.

SOFTWARE FILE

Productivity is now the single most important problem both for IBM and its users. This is the message rammed home by the massive range of software announcements accompanying IBM's launch of its strategic systems for the 1970s, the 4300 series.

For users, one of the key points is a greatly increased emphasis on packaged software and hardware. This will range from the delivery and maintenance of complete software environments, System I/IO/ES, to the supply of fully functional "application machines." There is also an extensive range of new interactive tools, including a time shared program development system for successor to DOS/VSE, DOS/VSE.

All of this, IBM hopes, will make it easier to install, develop, and maintain software, thus enabling customers to stabilise their programming costs.

For IBM itself, productivity problems centre round the question of support. A reduction in the per-CPU support requirement is essential to its entering the high volume low cost market at which the 4300 series is aimed.

It is complemented on the hardware side by the introduction on the 4300 of logical diagnostic subsystems, controlled by microprocessors, and the inclusion of the Remote Support Facility, giving access to the Remote diagnostic database over public telephone lines.

PETER HEWITT UNBUNDLES THE 4300 SERIES

Throughout the software announcements, two aspects stand out above all else.

The first is the enormously enhanced role of VM/370. Native mode VM is seen by IBM as a feasible operating system on both the new processors and it forms the base for the two recommended operating system combinations on the 4341. Three major new program products have been introduced in support of the new role, which has been forecast in Computer Weekly for the last year (CWL, January 5, 1978).

The second is the high degree of System 370 compatibility. The majority of the new software — including, for example, DOS/VSE — will also be supported on 3031 and 370 processors, while the 370 compatibility mode on the 4331 and

4341 implies that any existing 370 work can be migrated without alteration.

Users will thus enjoy virtually complete forward and backward compatibility, though the performance advantages offered by the ECPS firmware on the new machines would naturally encourage the use of native mode for new applications.

In the case of DOS/VSE, though, strong incentives exist for migrating to DOS/VSE as soon as possible. One is that DOS/VSE will not be supported on the 4331 after the end of this year. Another is that the new system offers performance advantages over the old even when running in 370 mode; these have been measured at 7% on a 370/145.

Series E shows road IBM is taking

DOS/VSE

AS predicted in Computer Weekly (January 25) the announcement of a massively enhanced version of DOS/VSE as the key operating system for the 4300 series has been accompanied by many functions previously intrinsic to the operating system now offered as licensed program extensions to DOS/VSE.

The foundation for all the new and enhanced software is VSE/Advanced Function — one of 33 new licensed program releases to be announced.

Among the products for which it is a prerequisite are new implementations of Vsam and Power, and the new telecommunications access methods Ram-ES and ACF/Vsam-E.

It also provides support for the new time sharing program development system, Interactive Computing and Control Language (ICCL). The latter is a central component of all VSE systems, providing such facilities as prompts, a full screen editor, job entry, a job execution monitor, and text manipulation.

Among intrinsic features of Advanced Functions are also space management, device independence, 12 partition support, automatic IPL, fast transient fetch, library sharing across partitions, multiple procedure libraries, and multiple label areas on DASD.

Two stages of release have been announced for nearly all the DOS/VSE software, with the first scheduled for June and the second for December.

VM

A NEW release of VM — with considerable microcode assistance and powerful facilities based on three new program products — supports the greatly enhanced role of VM on the 4300 series.

There has also been a second release of VM Basic Systems Extension, for the first time supporting the DOS RPG II compiler. BSE Release II is a

prerequisite for many of the 4300-specific devices, while basic VM support on the processors is provided by the new VM release, Release II.

Much of the software enhancement is designed to help make stand-alone VM/CMS more credible as a production system. In the case of Release II itself, this is evident for example in the introduction of CMS support for I/O.

It is also the main theme of the new program products, consisting of:

- IFS (Interactive File Sharing), which allows separate CMS machines to share files.
- DMS (Display Management System), which allows programmers to build screen layouts interactively for future use in application programs.
- RSCS/Networking, which provides networking capabilities superior to those in the existing Vnet product.

VM Release II has also introduced a "small systems option" which offers better performance to dedicated VM systems.

Performance is dramatically enhanced on both the 4300 processors with ECPS firmware, which cuts VM supervisor time by up to 80% on the 4331 and by up to 82% on the 4341.

VSI

WITH the announcement of Release 7, IBM has granted OS/VSI a stay of execution. However the company at the same time stressed that VSI remains the large system control program. This implies that VSI is a stepping stone on the growth path.

This role for VSI is confirmed by features of the 4300 announcement. Although supported by ECPS on the 4341, the operating system will run only in 370 compatibility mode on either processor, and does not support the new storage devices.

The new consoles, one of the new printers, and the storage control unit are the only 4300 devices supported.

Significant enhancements in Release 7 include new facilities for cross-partition communication, and support for concaten-

Manufacturing control package in Ansi Cobol

CONCURRENTLY with the new systems software, IBM announced a new applications package for manufacturing control that could be the basis for the first "application machine" offering.

Called Barpica, the software consists of 16 related application modules and was developed from the Data Centre package Prince. It is designed for the 4331.

The package handles the common manufacturing industry functions of material management and cost planning,

including components for engineering data control, inventory, and order release. An integrated system, it is intended to be installed without the need for additional coding.

Online facilities are provided for inquiry and data entry, while the remainder of processing is in batch mode.

The package is written in Ansi Cobol and runs in native mode on the 4331. Required control program support includes DOS/VSE, DL/I, DOS/VSE and CICS/DOS/VSE.



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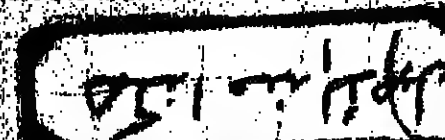
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"THE team effort I get from my operations staff is tremendous: their commitment is phenomenal."

Your average DP manager might utter such words in a last-ditch effort to pacify a band of rebellious operators armed with shotguns and after his blood. Chris Nunn needs no such prompting.

But then the head of computer services at Marks and Spencer's West London installation is no run of the mill manager; his 18 years in computing have been spent entirely in the operations sphere.

And when I met him, he spoke with an almost paternal pride about the technical expertise of his operations people and the vital part they play in the running of the site.

The emphasis is very much towards live work and meeting deadlines. If the online operations staff need technical support they get it quickly and efficiently, regardless of the time of day or night.

Said Nunn: "Our service controllers (shift leaders) do a management job 24 hours a day. They can call on whoever they need to ensure that the work gets processed."

Stressing their importance, he continued, "If a service controller says 'jump', we all jump. That means Terry Mitchell's guys, the programmers and the management. And if a programmer is called in during the night he stays until the problem is sorted out or gets the system analyst if need be."

Members of the operations technical support groups, key programmers and managers may be contacted at any time by means of radio pages.

The site is a member of a "club" comprising eight installations which provide back-up facilities for each other.

He considers standby to be an

Transition without tears at Marks and Spencer

on-going concern; the procedures and media are tested to take new systems into account.

He said, "We work on the basis that things won't work. We actually practise standby; we pick up our spare media, take it to the other sites and run the work. Then we come back, take



Chris Nunn

it to the other sites and run the work. Then we come back, take our wounds and change the procedures. Seriously, though, it's gone like nobody's business."

According to Nunn, the operators are treated as "intelligent individuals and are actively encouraged to give their views on the systems, applications and the general running of the site."

He said, "Everyone — from the lowest grade to the highest — is encouraged to speak up if

they don't like the way something is being done."

He continued, "Rarely do we reach the court-martial situation when you have to say to one of them, 'You — in my office!' It's usually enough to say, 'That's interesting, what you're doing with that tape, don't do it again!'"

For their part, the operations staff get a thorough technical and managerial training. When a trainee joins, he embarks upon a five-year career progression scheme which might lead to the position of service controller, a place in one of the operations support teams, or programming or systems analysis.

The site was run on rather different lines when Chris Nunn joined as operations manager in October 1974. Then it had an ICL 1904A with 128K of store, three EDS 8 disc drives and seven track tape units.

Said Nunn, "Sometimes programs were released by a programmer throwing a tape on the counter of job control saying 'use that for tonight's production run,' and then vanishing for the weekend. So I had to get the operations side cleared up."

His first step was to recruit Terry Mitchell, who is now operations manager, from Imperial College, and head of technical support, Harry Godfrey, from Eastern Gas.

"Both have extremely strong operations backgrounds and we set about establishing some operations standards. We

beefed-up the shift structure, the ideas of service controllers and support teams, and introduced proper documentation and program validation."

Before that, Marks and Spencer had commissioned Barie to design a big online system and, inevitably, they became deeply involved in the project.

In May 1975, the section moved to its current site in Gunnersbury, West London. They were involved in the design and conversion of the building and an ICL 1904S was

installed. The following year it became Marks and Spencer's computer services department.

Nunn explained: "The Marks and Spencer board of directors decided to cancel the order for the online system. They also decided to take over the Marks and Spencer unit of Barie as their own computer services department."

And in June 1976 a staff of 85, comprising operators, programmers and systems analysts joined Marks and Spencer.

He continued, "So Marks and Spencer, after having used a

bureau service for 10 years, has its own operation at the Marks and Spencer."

Since then, their main objective has been to keep pace with the needs of the company. That end, the operations and development staff has been successful, and the hardware used there have been increased in terms of size and sophistication.

He said, "In machine terms we have moved from a VAX running under a mainframe executive, to a 1904S with 128K and tapes and using George 3, and a 2970 running under VME."

"So, all in all, we have increased the number of programs processed and the number of programs running. All that took place over four years and we have only 3% of our staff. That's a fact."

Next week I interview the staff, and report their views on the set-up.

HINT OF THE WEEK

George 3: Servant or master?

IS George 3 a tyrannical master, ordering the operator about the computer room or an aide ready, willing and able to help him in time of need?

Ron Linton, computer operations controller at Manchester Poly, once described it as "despotic," or over-powerful, and said he preferred the George 2 operating system (Op Spot, CW, Sept 29, 1977).

But Geoff Westcott, author of this week's hint, claims that "it always comes to the rescue."

A software programmer and former senior operator, he writes: "When I was an operator at Hawker Siddeley Aviation, we used to print long lists of output, or, in George 3 terminology, list files."

"Each listfile was preceded and followed by a header and trailer consisting of six lines of characters across the page. Thus to extract a listfile, you merely had to find your header and trailer labels."

"That method works fine for short listfiles, but when they are longer — and some are as big as 300 pages — it is not so good."

"Now George 3 allows the operator to offline printers by means of the 'Wrong' command, which has the following format:

WR Unit Number, "And if the unit is printing a listfile, it will send the operator a message of the form 'Unit 115 Waiting To Be Wronged' and continue printing."

He goes on, "But, and this is the good bit, it will remember the request and at the end of the current listfile it will 'Wrong' the device and cease printing."

"At that point it issued the following message:

Unit 115 Wronged "So, when a long listfile is being printed, all you have to do is 'Wrong' the unit, and wait. George 3 will tell you that it is 'Wrong' the unit, and wait. You take your listfile from the printer and get it going again by using the Right command: thus: RI 115."

He concludes, "In this case George 3 will split up your listfiles for you, and all you have to do is Right and Wrong the printer."

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LETTERS TO THE EDITOR

Creating an image

THE image of computers and computer people (Downtime, January 4) is the creation of the computer people themselves, particularly the manufacturers. They can hardly complain, therefore, if the uninitiated take it seriously.

In the application of computers and microprocessors to typing, the office equipment PR boys have not only made extravagant claims, but by coining the term "word processing" have quite deliberately sought to mystify something that in principle is simple and pretty mundane. As a result, I, and doubtless others like me, spend a lot of time trying to explain what "word processing" is and why there is no need to fear it.

At the same time certain elements in the trade unions are finding it easy to mount a barrage of often ill-informed and always alarmist misinformation, drawing gleefully on ammunition provided by the equipment suppliers themselves. They are thus able effectively to hold up the development of more efficient office systems (particularly in the public sector), to the ultimate detriment of everyone — not least the suppliers. Let us hope that they (the suppliers) have learned a useful lesson for the future.

Meanwhile it is refreshing to read Chad's dispassionate assessment of the impact of so-called "word processors." He could reasonably have added that since the introduction of word processors, the question of the number likely to be replaced by these machines is in any case academic.

MANAGEMENT SERVICES PRACTITIONER

Name and address supplied

Wake up Sheffield!

I READ with interest that the ILEA has purchased 30 Research Machines 380Z microcomputer systems, especially in view of Sweeten's comment "The Midlands, Liverpool and the North East are where things are happening" (CW, January 18).

As a physics teacher and one who hopes shortly to introduce a computer studies course at Newfield School, Sheffield, I occasionally get the feeling that the action is all around but certainly not in Sheffield. There is a great deal of prevarication about which system to adopt, although in my view the 380Z is the obvious candidate. I think that this attitude is in part due to the lack of "computer industry" in this area. We don't even have a single computer shop, which for a city in excess of 500,000 people must be some sort of record.

Down in the "8th South" where computer business (hardware and software) proliferates, the ILEA and other authorities are obviously not in need. Please wake up Sheffield. I am tired of it being the biggest village in England.

Dr R. A. COOKE

Sheffield

THE EDITOR welcomes letters commenting on subjects published in Computer Weekly, or on original topics. All letters must be accompanied by the writer's name and address, not necessarily for publication.

Universities sign 'substantial' terminal products discount deal

UNIVERSITIES throughout the UK and Ireland are now able to obtain a range of standard terminal products at substantial discounts, following a deal between the Inter-University Committee on Computing, and Geveke Electronics. The company is making sizeable savings on

the cost of selling, by offering only limited demonstration facilities, and in return will supply machines in any numbers, even singly, at the 50-off price.

Since the universities know exactly what they want and the range of equipment is limited, this benefits both parties.

Four machines are offered: the Diablo daisy-wheel printer, the Teletype 43 matrix printer, the TEC 502 inv-cost VDU, and the Tektronix Industries cassette drive. The saving on a daisy-wheel printer is about £300.

This is a trial scheme due to end on July

31, but may be extended indefinitely. The product range may also expand, to include micro floppy disc drives and more elaborate VDUs.

Geveke is talking to ACUCHE, which represents colleges and polytechnics, for which a similar deal may be arranged.

Computer aids jobless teenagers

JOBLESS teenagers in South Glamorgan may soon have an easier time finding work, thanks to a special computer system being developed by the county education department's careers service.

Lists of applicants and vacancies held on the county council's mainframe will enable careers officers to compile short-lists without having to search by hand through thousands of cards.

Initially there will be two separate parts of the system: one for applicants and another for vacancies.

When looking for likely

people to fill a job, the careers officer will key in such factors as age, sex, number of O-levels, and area of residence, and the machine will carry out a coarse selection to produce a short-list of say 20 names. From these the officer will probably select six for interview.

Similarly, when a young person comes into the office a search can be made on the vacancies file.

There is no automatic correlation of names with jobs yet, but this may be introduced later.

John Maxwell of the education department, says the project is costing about £45,000 for

programs and extra terminals. It runs on a 1900 which is due to be upgraded to a 2972 in June.

The careers service is separate from employment exchanges and jobcentres, which are run by central government.

Select Committee to look at micros

THE Parliamentary Select Committee on Science and Technology has decided that its technological innovation sub-committee should investigate the impact of microelectronics on industrial innovation in the UK.

'Only fully-automated chip mounting system' says ITT

REEL to reel automatic chip mounting equipment has been installed at ITT 80micronductor's factory in Farnborough, Kent. Developed at the company's Farnborough, West Germany, plant where it has been in use for two years, the equipment is claimed to be the only fully automated chip mounting system in the world.

It will play an important role in ITT's drive to achieve an overall 20 per cent annual growth rate in advanced microelectronics, doubling turnover by 1982 to become one of the world's top five semiconductor producers with 10% of the world market.

The unit shown here takes individual chips from a segmented wafer and connects the leads in the carrying frames to the pads on the chips with 25 micron gold wire. The equipment is self-aligning.

Over the last two years 15 million has been invested in this and other automatic assembly line equipment at Farnborough, as well as in ion implanters and projection aligners for wafer production, automatic test systems for quality control and computer aided design equipment.

A further £10 million investment is planned, part of which is to be funded by the Department

at Industry (CW, September 7, 1978) to get into VLSI production in the quantities needed to make it economic.

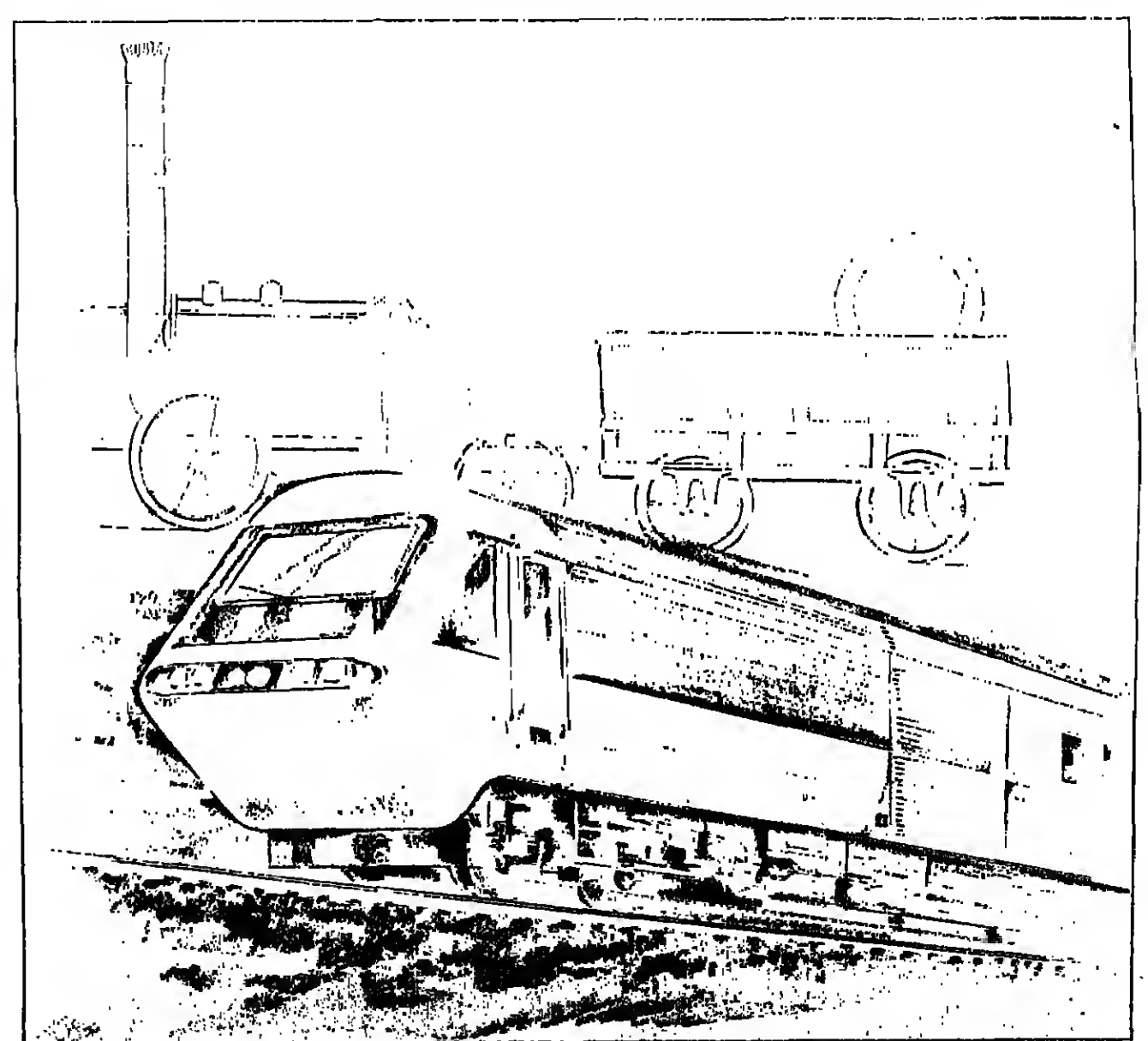
Electronic mail bureau opens in Stockport

A BUREAU offering word processing and electronic mail services to the public has opened in Stockport, Cheshire. The firm, called Tortext, will send documents to any recipient who has, like the bureau, a VDU or Wang communicating word processor.

Tortext's main business at present is in preparing specifications for engineering companies, bills of quantity for surveyors, direct mail adverts, and the like.

Export documentation, which is now becoming highly standardized, is a particularly fruitful field for WP, according to Len Anderson of Tortext. Phototypesetting from WP documents can also be done, he said.

Providing an electronic mail service for third parties is politically somewhat contentious, because it involves the Post Office monopoly of common carrier services. According to a Post Office spokesman, a licence is required, but it is present the Post Office is happy to grant such licences because it does not consider such a service is competing with the mails.



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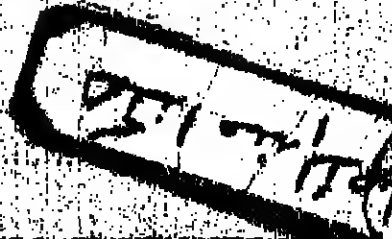
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PEOPLE AND EVENTS

Ex-governor
for Control
Data

A FORMER Minnesota governor, Rudy Perpich has been appointed by Control Data Corp to the position of vice-president and executive consultant of Control Data Worldtech. In his new position, he will be responsible for international trade development, and also for the development of trade opportunities in Eastern European countries for Worldtech and for Commercial Trading Imports, another Control Data subsidiary.

Perpich, who has a doctor of dentistry degree from Marquette University, Milwaukee, was governor of Minnesota from December 1976 to the end of last year. He was previously the State lieutenant-governor, and served in the State Senate from 1962 until 1970.

Ken Burningham has joined Redifon as international systems engineering manager. Until recently he was European sales manager with Digital Development Corp. Appointed as economic forecasting manager for Ken Churcher, who was previously management services administrator for Redifon, and before joining the company worked for the National Association of Head Teachers.

Diana Bennett has become a consultant in the training division of BIS Applied Systems. She was until recently a senior systems designer with the Royal Borough of Kensington and Chelsea.

David Daley has become a personnel manager for North West Europe for Data General. He joins the firm from Univac where he was employee relations manager. In his new position he replaces Owen Wright who has been promoted to compensation and benefits manager, based at Data General's European headquarters in Paris. Tony Gray has become district manager for the North, based in Manchester. Before his promotion he was branch manager for the South East.

Ray Lett has become senior salesman for major accounts between London and the South Midlands, for Advanced Micro Devices (UK). He was formerly an OEM/Industrial salesman with Motorola.

Alan Bell has been appointed Northern region marketing manager for the data processing division of Honeywell Information Systems. Bell, who will be based at Cheadle Hulme in Cheshire, was formerly marketing manager for the Honeywell branch serving Littlewoods.

Dr. Brian Ford has become an area sales engineer for the South West region for Sintrom Electronic. Prior to joining the company, he was a salesman for test equipment with Siemens.

Chris York has joined Redifon Computers as systems analyst for the London branch. He was previously a systems support engineer with ICL.

Promoted to the position of systems analyst for the Scottish branch is Maria Muir, who joined the company as an instructor and was previously a junior systems analyst.

Anthony Alcock has been appointed as financial director for Data Recording Equipment. He was previously director of Oranica with Data 100, and is also a certified accountant. Formerly special accounts manager, David Lax has been promoted to the position of UK and international sales manager, controlling sales of products in the UK and Europe except France, Austria and Germany.

Nick Thornburn has been appointed distribution manager for the UK sales operation for Silconix, following the move of Barry Boulton from this position to Silconix in Santa Clara, where he will assume responsibility for linear IC marketing. Thornburn was formerly accounts manager with ITT Semiconductors, and before that was with Compton Parkinson.

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NATHOLIE is to be the name of National Holidays' new computer. It was the suggestion of June Meers, who won the company's nationwide competition to find a name for its computer banking system. Mrs Meers, who works at the Orlent branch of Hyde-Barker Travel, is pictured here receiving first prize, a portable television, from National Holidays' marketing manager John Kelly, with (from left) the firm's sales manager Mike Bld, managing director of Hyde-Barker Travel, Michael Hyde-Barker, and director John Vickers. The computer is a Digital Equipment PDP-11/70 in Sheffield.

OBITUARY
ICL's Richard Dryden
dies in motoring accident

RICHARD DRYDEN, one of ICL's most promising young managers, died in a motoring accident in Luxembourg on Friday, February 2. Since joining ICL 13 years ago as a computer operator, Dryden, 31, had many and varied jobs within the company. He worked on early releases of both the 1900 George III and the System 4 Multijobbery systems, and later he moved to the 290 series in its early days.

His last project concerned installation of a 290 system for European Commission in Luxembourg where he was customer support manager. He leaves a wife, three sons and a daughter.

VAX:
"An implementor's dream."

Dr. Brian Ford, Director, Numerical Algorithms Group
Oxford, England/Downers Grove, Illinois



MICRO NEWS

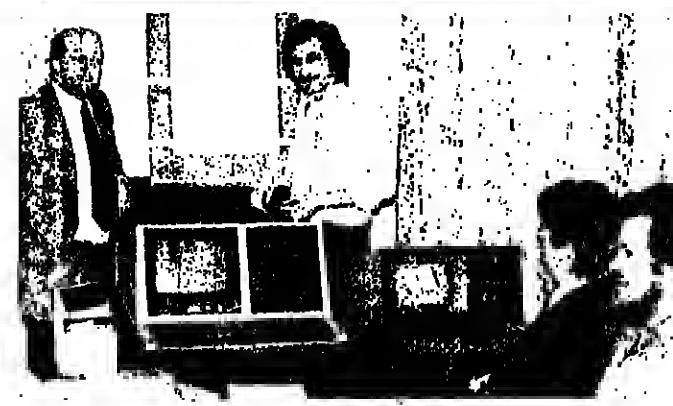
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for training
schemes

OVER £500,000 has now been committed by the government to supporting microprocessor training schemes, and according to Alan Williams, Minister of State for Industry, the number of training courses available will double in 1979. The DoI is also working with the Open University on an awareness course on micro for managers, and a technical course for engineers.

Facts for small
town police

WORK now being carried out by a research group in America may give small town police the same type of statistical patrol, and manpower information currently available only to big city police forces in the US.

The work is being carried out by the Institute for Public Program Analysis in St Louis. The end product is a software package called Patrol/Plan.



Imsai instruction

STAFF at Woking-based Data Precision got in-depth instruction on software development for the Imsai VDP80 microcomputer system from managing director John Ceneran (left) and Jean-Marie Releford, managing director of Imsai's European distributor Electronic at Photo Equipment, at Busy, France.

John Ceneran has, since last October, been the sole UK distributor of Imsai systems.

Releford was at the company's headquarters last week, visiting the development of software for a County Council order for Imsai equipment that is expected to be placed this week.

His company has been Imsai's European distributor for some three years, since the UB-manufacturer first decided to penetrate the European market. He says that the current installed base in Europe is some 50 systems, though the growth rate has recently started to grow exponentially.

Releford is now launching a new company, Microland, that will handle distribution for a wide range of systems, including Alpha Micro, Cromemco, and a Dutch company, Sintech, that was "discovered" by Data Precision, and is being handled by ICL in the UK.

Intel extends the 8086
range—and plans
for Pascal and Cobol

ON a flying visit to the UK last week, Dave House, marketing manager for Intel's microcomputer components division in Santa Clara, California, spoke about some of the new developments that can be expected over the next two years to extend the capabilities of the 8086 16-bit microprocessor.

In addition to a new maths processor chip, the most notable of these developments is in software. The company has changed direction from its position last autumn. Then software product manager, Mike Kane, said that Intel had little interest in the rise in popularity of Pascal as a high level language and that the company had no plans to introduce a version of it for the 8086.

There were also no plans to support Cobol (CW, October 26, 1978).

Now, according to House, Intel is committed to producing Pascal for the 8086. The language should appear probably within a year, and within 18 months at the outside.

Plans also exist to provide support for Cobol, although not in time-scale yet exists for this development. House said that the Cobol planning was still being worked on, and hinted at the possibility of an outside software house being brought in to produce the language to the company's specification.

He also announced a price reduction on the two versions of the 8086 already available. The 5MHz part has had 23% lopped off its price, bringing it down to £18.57 each in 500-up quantities, while the 1 MHz version has been reduced by 21%, bringing its price down to £14.53 each in 500-up quantities.

The maths processor chip, which as yet has no quotable type number, will be joining the 8 MHz version of the 8086, the 8086 8-bit bus compatible version of the processor, and the 8089 I/O processor, all of which are scheduled to appear over the next year (CW, November 24, 1977 and January 11).

According to House, the new maths processor extends the 8086 performance in arithmetic operations by about 100 times, without changing any applications software. Unlike the Advanced Micro Devices' 9511 floating point maths chip, which is a slave processor, the new Intel part will be a co-processor with the 8086.

This, House explained, meant that it would share the bus with the main 8086 CPU in a system and operate directly with it, providing, in effect a dedicated maths-oriented extension to the 8086 instruction set.

He also alluded to two future developments of the 8086 processor, giving them both the pseudonym of 80XX type numbers.

One he called a highly integrated system processor, which he expected to be introduced by mid-1980. Though House would not admit it, it seems likely that this is the rumoured single chip version of the 8086, which will have ROM, RAM and I/O on board (CW, January 11).

The other he referred to as a higher performance system processor, which might well be the new 16-bit processor Intel is

rumoured to be developing (CW, January 11). The type number attached to this rumoured part, 88000, is now understood to be 10 times less — 8800.

Questions on the growing competition in the 16-bit micro market elicited some interesting responses from House, as he listed the companies he sees as being major competitors.

The biggest threat to Intel, he felt, would come from Mostek, which last year took out an official second source agreement for the 8086 (CW, November 23, 1978). They would be closely followed by a group of other, unspecified companies, which are currently working on "reverse engineering" the part unofficially.

As for the other types of 16-bit processor amount of coming up, he saw less threat. Texas Instruments, for example, with the 9800 part, was not seen as a real competitor, even though the company could never be discounted in the semiconductor business.

On the Zilog Z8000, he felt the company "might miss the window", if it did not introduce the 2-chip, 8 Mbyte addressing system by mid-1980.

Zilog is known to be going through a design iteration on the first version of the chip, which has only 64K bytes addressing, and is not expected to ship fully characterised samples until the middle of the year.

House felt that the specified architecture of the Motorola 68000 was impressive, and the device could be noteworthy. However, he suggested that it would require a very advanced and complex production process to manufacture the chip, hinting that it might even be beyond the capabilities of Intel's own CMOS process at present.

The implication of this assumption is that the die size of the 68000 may either be very large, and therefore difficult to make in volume, or that Motorola may have to tone down the specification of the part.

On devices like the Fairchild Microflame processor, which emulates the Data General microNova instruction set, House said that he did not see them as big competition. As he put it, Intel produces as many processors as the total installed base of minicomputers every two to three months.

Byte Shop grows

A PRIVATE London College will use a micro-based time sharing system to teach programming in Extended Basic. The £9,000 system is a Crimmemro System 3 supplied by the Byte Shop in Ilford, and includes three teletypes and a VDU, a dual minitoppy disc drive, 18K bytes of static RAM for each of four users and 48K bytes of RAM for the system software.

The System 3 is based on a Mostek Z8000 microprocessor running at 4MHz, and can be expanded to support up to seven

VDUs with 32K bytes allocated to each.

The Byte Shop is to open another London branch in Tottenham Court Road, and other branches are planned for Manchester, Birmingham, Leeds and Glasgow.

A Nottingham branch has also been opened, under the management of ex-IBM man John Braga, and it will also be the dealers in the Midlands for the ITT 2020 microcomputer system.

Ferranti's new converters

TWO new converter chips have been introduced by Ferranti Electronics specifically for use in microprocessor-based systems.

They are the ZN 427 successive approximation D-A converter, and the ZN 428 latching D-A converter. The ZN 427 is a microprocessor compatible 8-bit unit suitable for use with digital

tributed processing systems. Housed in an 18-pin package, it incorporates a 2.5 volt precision reference, and successive approximation logic with three-state outputs for data bus sharing.

The ZN 428 contains multiple D-A with voltage divider output, latches, and a 2.5 volt precision reference. It is housed in a 16-pin package.

For the Numerical Algorithms Group, the plain fact is this: "Software implementation was faster on the VAX-11/780 than on 25 other major machines."

Before VAX, Dr. Ford's staff had implemented NAG's complex FORTRAN Mark 6 Library on 25 major machines ranging from minis to mainframes, including the Burroughs 6700, CDC7600, Univac 1100, and IBM 370. The average implementation time was 13 man-weeks.

VAX took five. In Dr. Ford's words: "The NAG FORTRAN Mark 6 Library consists of 345 subroutines covering the major areas of numerical mathematics and statistics. It's used in applications such as structural design, nuclear physics, economic modelling, and academic research."

"A successful implementation requires the correct functioning of the 345 library routines to a prescribed accuracy and efficiency in execution of NAG's suite of 620 test programs. Whilst the activity is a significant examination of a machine's conformity to the ANSI standard of the FORTRAN compiler, its main technical

features are file creation, file comparison, file manipulation and file maintenance."

And then there was the record of VAX reliability: "No problems were encountered in the VAX/VMS software even though approximately 3000 files were being handled. The operational availability time for the machine was close to 100%, an outstanding statistic for new hardware and a new operating system."

What all this demonstrates is that some of the most sophisticated FORTRAN routines in the world implement easily on VAX. That VAX capability exceeds that of many machines far more expensive. That the VAX-11/780 is more than the most powerful 32-bit computer in its price range. That VAX is truly "an implementor's dream."

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TWO Canadian students who used a university computer by remote terminal without permission have been given one-year suspended sentences for "theft of telecommunications services" by a federal court in Edmonton. Prosecutors decided on this charge because there was no federal statute outlawing the theft of computing services.

THE U.S. Justice Department's anti-trust suit against IBM is now 10 years old, and US observers believe it could drag on for another decade.

Latest development is a massive new demand for information from the Justice Department.

If allowed by the court, could force IBM to disclose many of its highly confidential intra-company plans in both the computer and communication businesses.

The Justice Department believes that actions by IBM helped force both General Electric and RCA out of the mainframe business, although both companies deny this. It also believes that peripheral manufacturers like Telex and Motorola were severely hurt by IBM retaliation.

Last year, Jacques Lemmonie, the new managing director of IBM France, complained about the slow growth in IBM's public sector business in France (CIV June 29). Since then, the French government has announced a new "Plan Calcul" for the development of the national computer industry intended to help local companies to compete more effectively with IBM.

IBM has also suffered in the hands of the Italian government. So far, two ministries — the Treasury and the Finance Ministry — have replaced large IBM mainframes with Amdahl 470s. With four Amdahl 470s installed and more on the way, the Italian government is the first to make a major investment in large IBM-compatible mainframes.

A great leap forward in processing power has turned Asian Computer Services Ltd into one of the biggest bureaux in Singapore. The company, a subsidiary of the Haw Par Brothers trading company, has replaced its IBM 370/115 with a \$1.5 million 370/138 with the aim of adding many new clients to its present roster of 50. Under 10% of the bureau's \$1.2 million annual revenue comes from Haw Par.

The Confederation of Irish Industry is also involved, and the Department of Economic Planning and Development is awaiting the outcome with interest.

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Fresh look at PTT's telecom monopolies

Shortly before the end of 1978, the UK National Committee on Computer Networks published its report. The committee's 17 members included four top level government administrators and a further four executives of state-owned corporations, including the Post Office. Yet, with only the representatives of the Post Office and of the Post Office Engineering Union dissenting, the committee made some startlingly radical recommendations to relax the Post Office monopoly hold over equipment that can be

attached to the public switched telephone network, on the provision of value-added services such as message switching, and suggested the removal of restrictions on the interconnection of private leased line networks with the public network.

In this Marketview, FRED LAMOND examines the historical background to current PTT monopolies in Europe, and the technological developments that are now forcing these to be reassessed in other European countries as much as in the UK.

PUBLIC switched telecommunications facilities are state monopolies in all European countries, although patterns of organisation differ.

A small part of these telecommunications monopolies is "natural", ie determined by the nature of the service itself. This includes the provision of local exchanges within contiguous urban areas, the junction lines between these exchanges, and the lines from these exchanges to individual subscribers' premises.

Unlike North America, however, European telecommunications monopolies go well beyond the boundaries of this "natural"

monopoly. They include the provision of long distance and international trunk circuits, although the multiplication of trunk carriers required by telecommunications traffic between the main metropolitan areas, and their increasing diversity allow a measure of competition.

European monopolies also embrace the provision of private leased telegraph, telephone or wideband circuits that pass over the public domain, and the provision of value-added multiplexing, packet or message switching services on leased or switched telegraph and telephone lines. The authorities

also have the power to regulate the types of devices that may be connected to their public switched networks.

The British, Scandinavian, and Swiss PTTs use this regulatory power to impose a monopoly on the provision by themselves of all line attachments to the public networks and such private leased lines that may interconnect with them. So does the West German Federal Post Office for modems used to connect digital data terminals.

The motives behind European PTTs' insistence on such embracing monopoly powers — and behind North American

telephone companies' desperate attempts to get back to a similar situation by sponsoring Congressional legislation — are not unworthy. They are closely linked with all telephone engineers' and administrators' ideal: "universality" of service, "a telephone in every home."

The cost of connecting many outlying farms and houses to the public network might well be beyond their owners' means. If the PTTs charged it to them in full, all PTTs therefore subsidise telephone installation costs to a greater or lesser extent.

They have to recover this installation subsidy somehow, and their preferred medium is the

call charge. Telephone subscribers thus pay in proportion to their use of the system.

To offset the subsidy on installation costs, call charges must be correspondingly higher than the incremental cost to the network of each call.

A supplier can only engage in such "functional" pricing, however, if he is in an effective monopoly situation. In any competitive environment, charges are soon pushed down to no more than a normal profit margin above marginal incremental costs.

It is because they rely so heavily on call charge revenue to subsidise installation costs, that European PTTs dislike the provision of leased lines, on which rentals are distance and quality dependent, but not usage dependent.

Although the charges for such lines are high, PTTs feel that their use somehow "cheats" them of call charges.

Leased lines may only run between premises owned by the same company, or group of majority owned companies, except in exceptional circumstances for special purpose networks such as the SITA air reservations system, and the Swift International inter-bank transfer network. Even then, the leased line user may only use it for his own intra-company traffic, or for the special purpose for which the network was authorised.

The only exceptions to this prohibition on the interconnection of private leased lines with the public network have been the British Opticnet and French Transplex services, that allow the clients of commercial time sharing services, or the remote offices or factories of a large company, to ring a local concentrator node at short distance charges, to transmit data to their national centre.

The equipment monopolies exercised in the UK, Scandinavian and Switzerland are an extension of the same principle. The provision of a ubiquitous and efficient engineering service to telephone subscribers is seen as an essential part of a universal telephone service. The spread of overheads over all subscribers, allows a lower cost of maintenance to each.

If PTTs allow free attachment of any device of a subscriber's choosing to the telephone network while insisting on maintaining it, their investment in stocks of spare parts for all the devices would soon grow out of all manageable bounds.

Thus a monopoly on the provision of maintenance services leads almost inevitably to a monopoly on the provision of the attached devices themselves.

The only alternative is to restrict the number of choices open to the user by means of type approval. This is the method preferred by the French and West German PTTs among others, and by the British Post Office itself for PABXs with more than 100 internal extensions.

As long as the telephone network was used for point-to-point business, these restrictions on line attachments and the interconnection of private and public networks were at worst

approaching a time when the use of stored program logic in the form of microprocessors, minicomputers, as well as broadband transmission such as communications satellites and fibre optic cables, led to an increasing convergence of telecommunications with TV broadcasting and computerised data processing.

In this rapidly changing environment, there is a great danger that the manner in which European PTTs currently enclose their monopolies to hamper technological advance by the European computer and telecommunications industries. This in turn could cause these industries to lose international markets to less inhibited America and Japan.

In this new multi-purpose "telematic" environment, devices attached to both analog and digital telecommunications networks will not be fitted to audio handset telephones.

They may include any, or a combination of: a speaker and receiver, and/or alphanumeric key, single or multiline alphanumeric display or graphic display unit, impact, matrix printer or trustable serial or line printer, OCR or facsimile decoder, readers, all under the control of one or more program microcomputers with sizes of main memory, auxiliary local file and storage.

How could Europe possibly decide in advance which combinations will be the needs of most of the users? Only the users themselves can decide this, if they are given a free market choice.

To be fair to them, European PTTs saw the problem long in the mid-Sixties and then they had solved it with a modern boundary concept. Whenever equipment is connected via a modem to a line, it is the modem which counts as the "terminal equipment" to which the PTT supply monopoly or approval applies.

This compromise was possible with mid-Sixties technology, but since then the pace of change in the semiconductor industry has been so rapid that it is now possible to implement complex high performance modems on a single microprocessor chip costing only a few pence, and to incorporate in the terminals themselves.

Under present European rules such integrated terminals are not allowed.

The UK National Committee on Computer Networks has called for a relaxation of the Post Office monopoly on line attachments. This has been done in the case of the viewdata terminal, which is allowed to be connected to the approved modem by a case of dipswitches, or by a TV rental company with private equipment.

But this, says the Office, is only a separate expedient for terminals used by business and industry. The convergence of telecommunications and computer applications and the

From page 16

lead not only to a proliferation of different types of terminal equipment, but also of the uses to which they can be put, and the "value added services" that can be provided.

Packet switching networks are only one of many types of value added service, and the one closest to the PTTs' traditional message transmission functions. Store and forward message switching services are another type.

Such value added services require an additional investment of capital, to pay for the required hardware, software and staff. Not all of them will meet a level of demand sufficiently high or urgent to enable them to be profitable, and PTTs cannot be expected to provide them all.

But if the PTTs do not want to risk the capital to launch a new type of value added service which should not private entrepreneurs be allowed to do so? The users of their services would be the prime beneficiaries. That is why the National Committee on Computer Networks recommended limited licensing of a number of competitive message switching and other value added services for an experimental period of 10 years.

Finally, interconnection of private leased line networks and the public switched telecommunications networks would allow a more rational use of scarce long distance trunk channel resources.

In the UK, all these recommendations to relax the Post Office monopoly were opposed by the Post Office Engineering Union representative on the network committee, and it is easy to see why. At a time when the gradual replacement of electro-mechanical Strowger switching exchanges is leading to a sharp reduction in maintenance work required, the union does not want its members to lose any of the work that they now carry out at subscriber sites.

But that is taking far too gloomy a view of the consequences of such liberalisation. A relaxation of the equipment monopoly, for instance, does not mean that the Post Office and other European PTTs would have to withdraw entirely from either the supply or the maintenance of line attachments.

They could compete with private suppliers for the supply and maintenance not only of handsets and modems, but also of all the different types of terminals from the supply of which they have excluded themselves.

Their engineers would thereby gain for more maintenance work on digital data and integrated terminals than would lose working on PABXs and present equipment.

If the post offices further broadened their activities to offer their services as third party maintenance services for the main computer and terminal ranges, they would be opening up the computer market to more competition. Instead of preventing the telecommunications market from innovating and expanding.

And the more competitive the European computer and telecommunications industries are, the faster they will be able to expand their turnovers and the jobs they have to offer.



Fred Lamond

FCC is asked to reject AT&T's new venture

BECAUSE AT&T's proposed Advanced Communications Service is predominantly a data processing service, it should be rejected by the Federal Communications Commission. This is the case being made by the Computer and Business Equipment Manufacturers Association in a submission to the FCC.

According to CBEMA, the AT&T venture is seen as "the sheerest attempt to ignore the FCC rules and definitions, and to mask the true nature of the service by use of communications terminology where the result would include an unprecedented extension of regulation into the presently competitive marketplace for data processing services."

CBEMA said it is convinced that ACS offers predominantly DP services to the public. That conclusion was reached, the association explained, because the bulk of ACS services involved extensive storage and manipulation of data unrelated to the transmission of an addressed message through the network to another terminal or host.

In addition, CBEMA said it believes that the AT&T argument that ACS will not be used for DP services has no merit. Any parts of ACS that, standing alone, might be permissible as communications services are so interwoven with predominantly data processing features that the entire proposal must be rejected as a DP service.

CBEMA was particularly irritated by AT&T's use of communications terminology in its descriptions of ACS when DP terms were more appropriate. "There are vital features proposed by AT&T which require the handling of databases characterised by AT&T as stored messages and provide retrieval or manipulation of the data in the messages according to programmed instructions stored within ACS and prepared by the customer or by the carrier. These services have little or no relation to moving an addressed

message through a network to its recipient — the primary characteristic of a communications service."

"Rather," the statement continued, "the utility of the message services to the customer depends on tailored programming and stored data, the hallmark of data processing services. They are nevertheless, and for obvious reasons — do not constitute 'message' services rather than the database management and data processing services that they are."

In another instance, CBEMA cites features of ACS that allow an interactive exchange between a terminal and the network as evidence of its contentions.

The CBEMA adds, "While some of these features have been permitted as adjuncts to the communications services provided by other carriers, the call services of ACS are inextricably interwoven with tailored customer programming and the

message services, such that both form predominantly data processing offerings."

The trade association concludes that the FCC "should make clear that the use of stored messages or network capabilities for data processing applications that are unrelated to the primary communications purpose — moving a customer's addressed message through a network in its recipient — cannot be allowed as a tariffed offering."

CBEMA is not alone in its request that the FCC deny AT&T the right to offer ACS as it has been proposed. The Computer and Communications Industry Association has also filed a brief with the FCC asking that AT&T's petition be denied.

CCIA, like CBEMA, believes that ACS will be a computing service, and that as such it cannot be offered by AT&T. CCIA describes the proposed ACS facility that enables users to manipulate messages within the

ACS system as data processing. CCIA asked the FCC to restrict AT&T's offering to a packet switching service, which it believes falls within the scope of the law. And even if AT&T should alter ACS to meet CCIA's suggested scope, the CCIA believes ACS should only be offered through a separate subsidiary of AT&T.

While the two industry groups, CBEMA and CCIA, hope that the government will ban or at least restrict AT&T's offering of ACS, Digital Equipment Corp., America's largest maker of minicomputers, favours the Bell System proposal for a nationwide communications net.

In DEC's opinion, ACS is a communications service, and one which will solve the compatibility problems users face.

DEC also said that the ability of ACS to translate among various data rates, data representation methods and communications protocols will foster competition.

WASHINGTON REPORT BY CAMERON DAVIS

Telenet contract

TELENET Communications Corp has won a \$4.5 million contract with the US Department of Agriculture.

Under the contract, Telenet's nationwide packet network will interconnect four USDA computer centres and 600 data terminals at approximately 300 US locations.

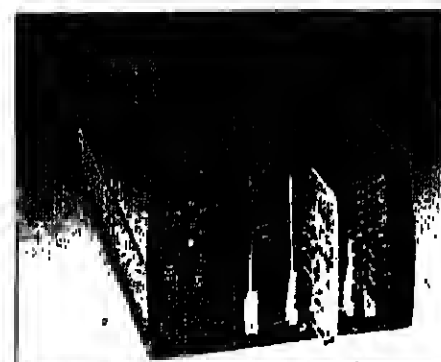
Principal users will be the US Forest Service, the Farmers Home Administration, the Animal and Plant Health Inspection Service, and the Science and Education Administration.

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Congress on China's DP needs

ALTHOUGH the electronics industry of mainland China has progressed rapidly in recent years, shortcomings remain in product quality and technical sophistication, according to a report to the US Congress.

Entitled "The Chinese Economy Post Mao," the report was released by the Joint Economic Committee shortly before the official establishment of diplomatic relations between the US and the People's Republic.

"Most of China's computers are one-of-a-kind or batch assembly items developed independently. At a number of research institutes and production facilities," the report states, it adds that installed computers "are clearly inadequate in numbers and capabilities to meet military and industry needs or to train sufficient personnel in computer applications."

At the same time, electronics production tends to lag 10 years or more behind the state of the art in terms of embodied technology.

The answer for China, the report states, is to continue to import electronics if the country hopes to acquire "basic experience in all areas of production."



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from Iran to Moscow

AMERICAN Telephone & Telegraph, the largest US communications company, has suffered disruption of a major project in Iran due to the political turmoil there.

At the same time another branch of the company hopes to get a contract to supply the Soviet Union with a huge telecommunications manufacturing factory.

Hundreds of AT&T employees have been sent back to the US, according to a spokesman for American Bell International, a wholly-owned subsidiary of AT&T set up to provide know-how to the Iranians.

AT&T was hired in August 1975 to fulfil contracts totalling \$184 million. These contracts include planning a modern telecommunications plant for Iran, making short-term improvements in the existing telephone service, beginning a number of engineering projects with a view towards modernisation, and reorganising the existing telephone bureaucracy.

AT&T was initially hired by the US government under a foreign military sales contract, executed through the US Air Force. In 1977, AT&T began working directly for the government of Iran, and in that year increased its revenues from \$31 million in 1976 to \$60 million.

Through AT&T, Iran had awarded more than \$1,000 million in contracts for telecommunications equipment. In addition, the Iranians were preparing to launch a satellite named Zohreh, the Persian name for Venus, via the American space shuttle.

It is not known how much of the equipment purchased by Iran under AT&T's management came from or would have come from other AT&T divisions.

Meanwhile, on the other side of the Caspian, AT&T's manufacturing company, Western Electric, is hoping for a \$200 million contract to build a factory for USSR to make telecommunications switches.

According to US reports, confirmed by a Western Electric spokesman, it will be competing for routes with ITT, the French firm Thomson-CSF and CIT-Alcatel, Sweden's Ericsson and Japan's Nippon Electric Company.

AT&T was initially hired by the US government under a foreign military sales contract, executed through the US Air Force. In

NEWS FROM AMERICA BY HESH WIENER

US economy takes new year

LEADING economists at one of Wall Street's most prestigious firms have predicted a difficult year for the US economy and severe strains on businesses requiring capital.

Henry Kaufman, of Salomon Brothers, led a team of experts to produce a study of future trends, US financial markets, said the report, "will reflect an economy struggling to maintain headway against the burden of near record inflation rates and cumulative monetary restraint."

This is the result of the weak dollar and "government follies," said the experts, and will probably cause the US gross national product to fall. The decline is expected late in 1979, following a period of slow economic growth.

Kaufman and his colleagues predict that businesses will experience their first decline in internal cash generation since 1974, when the last US recession occurred. This was triggered by the sharp increase in oil prices compounded by the sale of large amounts of US grain to the USSR and clumsy government policies.

The combination of recession and tax cuts will also diminish Washington's income. The report predicts that US Treasury borrowings will increase.

Compared to 1978, it is predicted that foreigners will contribute less new capital for the US, adding to the problem.

The various pressures on the money supply will result in continuing high interest rates in the US and the "prime loan rate will exceed the previously unprecedented 1974-75 high."

Recession fears are 'no threat'—Amdahl



DR GENE AMDAHL, founder and chairman of Amdahl Corp. foresees an excellent year ahead for his company, despite threats of a recession and the likelihood of increased competitive pressure from IBM and other plug compatible computer makers.

Amdahl recently cut the prices it charges for its equipment, bringing memory costs into line with

those currently charged by other leading mainframe makers.

The drop in prices has been about 9% but it is unlikely that the lowered prices will result in diminished profits. Amdahl Corp has recently shifted its memory manufacture from 4K chips to 16K chips, a move that cuts assembly costs substantially.

"We're rather insensitive to recession," said Dr Amdahl. "I think most of the computer industry is, because it offers one of the few ways of improving productivity."

One threat posed by the expected announcement of new large mainframes by IBM is less easy to counter, however. "The marketplace might go dormant for a while," Dr Amdahl pointed out, "while people wait to see what it really is that IBM has."

Amdahl had been also concerned that hesitancy on the part of customers would follow the announcements of 310X machines; but no lag in Amdahl Corp sales actually resulted from that series of new product offerings.

In addition to pricing changes, Dr Amdahl also believes his company can upgrade system performance and increase the functions the 470 series can perform. Such upgrades might be more difficult for the older machines, as they would be for systems made by any manufacturer.

Even though the early Amdahl computers may not be subject to upgrades, Dr Amdahl has reason to believe that they will have high residual values. The simpler coding requirements of the 470 computers, compared to 370 or 303X machines, and the compactness of the Amdahl machines are the basis for this belief.

"The 470 takes a lot of space. And you have to put in water cooling which, with a used machine, becomes a bigger and bigger percentage of its worth."

He expects IBM to continue to use water rather than air to dissipate the heat of its large

computers because IBM is locked into certain assembly techniques.

The automatic machines used to make IBM mainframes are designed to use a particular type of component packaging, and that packaging, combined with dense, high-speed logic, produces heat that cannot be dissipated by an air cooling system. This situation is likely to remain static, at least for the near future, in Dr Amdahl's opinion. I don't think they have addressed the problem of new component packaging early enough to affect planned mainframe offerings.

But IBM has become a more aggressive competitor of late and has forced other computer companies to move faster than before. IBM's introduction of new products with better pricing and enhanced performance places financial demands on companies that want to keep up the pace.

Amdahl Corp appears to be wealthy enough to weather the storm of innovation. "We've been in a state of positive cash flow of the order of \$100 million. When you consider we only did a little over \$300 million in revenues last year, that's not a bad cash position."

One area of great success for the company has been the reception of its products abroad. "Canada has been a gold mine for us, and the plant in Ireland promises to make European sales more profitable and easier to support."

"The Irish plant has delivered 'nearly a dozen' mainframes, V/5 and V/6 models. A V/7 has been started and its first product will be delivered soon."

Cautious optimism expressed by Wall St

US stock markets began the new year in a mood of cautious optimism. Prices have risen despite the flow of disturbing news from abroad, providing welcome relief to those who had seen their portfolios shrink during the final quarter of 1978.

One event that has helped improve Wall Street's outlook is the planned split of IBM shares. The division of shares by four will bring the price, now somewhat above the 300 level, down to a range that many investors can afford. Even with the gains in prices expected by most analysts, its shares should be selling for 80 to 85 when the split becomes official in May.

Harry Edelson, computer stock analyst with Drexel Burn-

ham Lambert, points out that the odds favour an improvement in IBM prices for the next several months. He says that with one exception, all computer prices have risen for about a year following an announced stock split. The exception is IBM, which came at the end of the 1974-75 recession. Industry experts another reason for the property, despite the fact that it could be a double-edged sword. The only way IBM can split is if it appears to be profitable, which is always a problem for new IBM systems. The new computer field, which is being served by many more companies than IBM, will



One of this leading experts on the computing and information industries, Charles Lecht, writes his first article for Computer Weekly.

Founder of Advanced Computer Techniques Corp. Lecht has been working in the computing industry since 1951 and has been running ACT since 1962. The company started as a "one man band" and now employs over 400 people in its computer services and software operations which include bureaux in New York, Phoenix, Arizona and Edmonton, Canada, and consulting operations in New York, Milan and Washington.

In 1978 Lecht was voted one of the top 10 businessmen in America for companies with revenue of under \$1 billion and his book, *The Wave of Change*, provided an original insight into the nature of technological innovation.

In this first article, Lecht provides an overview on one of the most significant manoeuvres in the computer business in recent years, the re-orientation of the Great IBM "Starship."

IT is a fair working hypothesis that IBM's "star fleet," with its six divisions including data processing, general systems and office products, initiated a significant change of course in early 1975.

In January 1975, F. T. Cary's announcement on the redirection of its proposed Future Series resulted in a shift in the major development thrust of the company and its businesses.

It should come as no surprise that the enterprise responsible for turning out most of the world's computer systems was also expert at using these very same instruments internally to forecast its own direction and new work orders of opportunity.

Synthesising increasingly complex world economic, political and technological data, and anticipating new threats and challenges to its position, IBM's high command demonstrated that it was acutely sensitive to the value of marketplace and competitive intelligence as major factors in charting its future course.

Today, IBM's direction prefigures that which will ultimately be taken by the entire information systems industry. To this point, I foresee all companies

will do all of this through a restructuring of itself as a more flexible and adaptive cluster of companies and through initiation of joint-venture-like arrangements (including part ownership) with many other companies. The starfleet is indeed changing while turning.

Some companies seem oblivious to the fact that IBM altered its course at all; their product plans betray their management's maladaptive instinct for following the leader wherever it goes.

Once having achieved ruling status in the early 1970s, IBM excited a measure of concern within the US Justice Department by virtue of the size of its arsenal of competitive weaponry (products, services, plants, cash, etc) and its practices.

Swift changes in "traditional" business boundaries such as those that have led to the collision of the communications and computer systems technology sectors, brought IBM into conflict with yet another previously benign superstar: telecommunications giant AT&T.

Equally fast-changing product profiles within the evolving information systems business

By Charles Lecht

Leading into the following: Mainstream: those companies which configure and manufacture information systems, from data migration through to dissemination, including manual as well as automated environments. These companies will purvey these systems and/or sell their data processing power.

Component: those companies which manufacture parts of an information systems environment, usually hardware and/or software.

Device: those which make processor logic-based items, some of which may be parts of a component (or components themselves) for an information system, although not necessarily. Included are all devices which have some form of artificial intelligence, usually through incorporation of micro-processor logic.

Consulting: those which market the services of one or more persons individually and/or severally (the work could involve high-level systems engineering and include all aspects of information systems endeavour at one time or another).

Fringe: those which provide specialised products such as supplies, facilities, etc.

While this classification system may not in itself seem too revolutionary when compared with today's, its corporate circumstances will be radically altered.

Although I see but a few companies in the Mainstream businesses in our future, there will be great numbers in the Component, Device, Consulting and Fringe areas; many more than now exist. Some may host "product/service lines" which involve items taken from several of these areas (eg, make a component, provide skilled people, etc).

have also resulted in friction between the great giant and the other micro-mini-maxi manufacturers and service companies.

At the same time, in the growing din of protest over unfair practices lodged against IBM were born new business opportunities based on the emerging ease with which companies other than IBM could introduce IBM-compatible or replacement products.

Despite all this turbulence, IBM's high command seems to have remained very cool, although examples can be cited where overreaction, bad timing, etc occurred.

1979 will be the year when today's information systems companies, unprepared to produce full information systems, will falter, either radically changing their businesses to Component, Device, Consulting, Fringe, or getting out of the industry.

Those that succeed will have accepted the fact that the process of information systems creation involves mastering a metaphor for the instrumentation of man and his environment.

One could argue, I suppose, that the waves of technological change which have swept over the entire information systems community could by themselves have accounted for IBM's change of course.

IBM's need to maintain corporate momentum (consider their revenue objectives, calling for increases of \$2 billion in 1978, \$3 billion in 1979, and \$4.5 to \$5 billion in 1980) might be viewed as the primary stimulus for its change of course.

What is so spectacular about this change of course is that thus far it has not seriously compromised yearly corporate objectives. In view of misallocations like Future Series and the timing of 370 systems introduction this was no mean feat.

As IBM changed course, its management kept a steadfast

silence on their long term objectives. Since 1975, it has deployed so many products as to obscure, at times, which are scheduled for long-term development and which are one-time phenomena. One thing that is clear from this is that great financial resources indeed would be needed by any would-be across-the-board competitor.

A company intending to attack an IBM one-time phenomenon marketplace may do so with reasonable chances of success. However, its business will be extremely susceptible to changes in IBM strategy for upgrading and/or migrating its customer base.

Starting with the small 5100 line, we have seen at least 12 major announcements in the

IBM's Starfleet changes tack

past three years including the 4100, Series I, System 32, 34, 38; the 3031, 3031AP, 3032, 3033 and SNA. It's my opinion that at a minimum, Series I (if not System 32, 34 and the 5100) is ephemeral although we may expect some limited upgrading to happen.

As formidable as IBM's corporate fleet may have appeared in 1975, its management's major decision to alter course was still heroic. The armada entered uncharted space (distributed networks, office automation, un-hundred and separately priced selectable software units, etc) carrying along in its wake much of the world's computer industry.

Since it is by no means a mil-

lardless ship, the IBM "Starfleet" headquarters has been carefully changing its business emphases from the manufacture of computer systems and office equipment to the integration of communications, word processing, process control, etc until the rendering of increased personnel services.

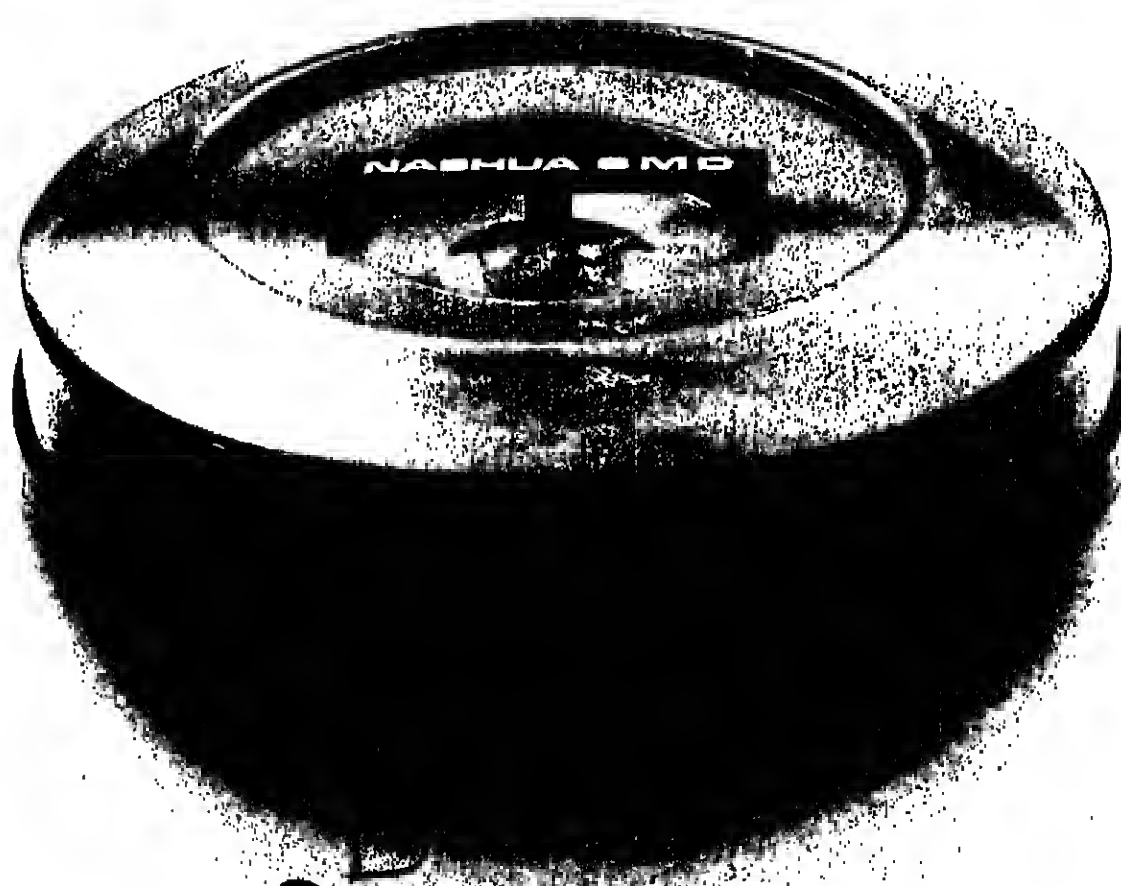
Although it is too soon to describe exactly the nature of its late 1980s businesses as IBM's management may envisage them, I see the emergence of IBM as a super-scale "information systems and communications utility" enterprise, ultimately depending only on itself for technology (although it may choose to buy some of it as it does today from TI, Intel and others), and purveying its wares,

hard and soft, through a galaxy of products and services.

Economic nationalism and the maturation of other US as well as foreign companies, notably Japanese, are a factor.

Some would say that corporate strife is serving to inhibit the corporation's progress, but I don't place too much trust in this judgement.

IBM's Starfleet may indeed be on target. Whether it will make it is not, of course, a foregone conclusion; uncharted voyages are dangerous. If it does — and there is good reason to believe that it will — today's debates on the nature of the world information processing industry at the end of this century will be settled.



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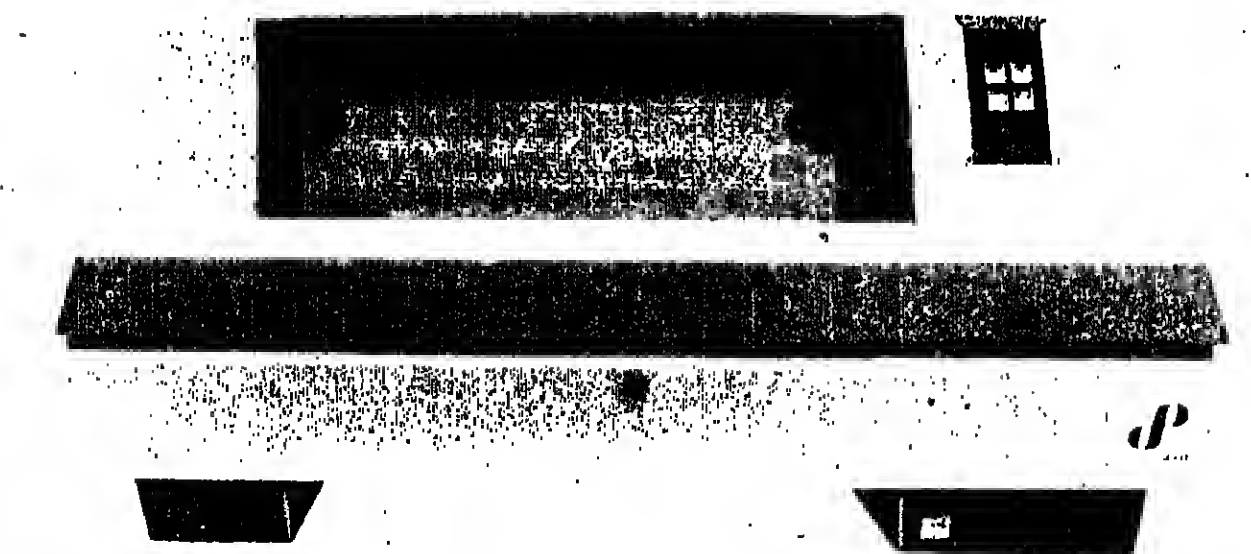
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INTERNATIONAL NEWS IN BRIEF

Guarantee for Tandberg lines

THE data systems side of the Norwegian electronics company Tandberg, declared bankrupt last month (CWI, January 11) will continue production this month under a guarantee from Siemens, a major customer for Tandberg peripherals. The plan is for the division to be spun off into a separate company in which Siemens would like to take a 40% stake, and negotiations on this with the receiver and the Norwegian government are continuing.

French coup

FRENCH communications specialist Jeumont-Schneider has scored a significant coup in the US, signing an agreement under which its large digital private telephone exchange systems will be marketed by Tele-Resource Inc. The American company plans to manufacture the 3,000 line exchanges under licence in due course.

Japanese venture

IN a joint venture between Memorex and Teijin, a Japanese textile firm, Teijin is to manufacture Memorex floppy disc media in Japan. Teijin already supplies Memorex in the US with polyester film. The new manufacturing operation will be 51% owned by Teijin, 20% by Memorex Corp and 29% by Memorex Japan.

Amdahl order

SYDNEY brewery Tooth and Co is reported to have ordered an Amdahl 470V/5 mainframe from Fujitsu subsidiary Facom Australia.

COMPUTER WEEKLY INTERNATIONAL

ICL finances catch up on CII-Honeywell Bull

FULL year figures for the 63% French-owned CII-Honeywell Bull show the company just ahead of Britain's ICL with a turnover of 4,500 million francs, equivalent to £258 million for the year to the end of December 1978. ICL's turnover, struck three months earlier at the end of September, was £508 million (CWI, December 21, 1978). However, ICL is catching up, since last year's CII-HB turnover of £446 million was well ahead of ICL's £419 million. ICL grew 22% in the year, while CII-HB grew 17.6%.

Second delegation from EEC leaves for India next month

FOLLOWING the success of last year's delegation to India of EEC software companies, another EEC computer delegation will leave for the sub-continent on March 17. In part as a result of comments and recommendations made by the last delegation, the Indian government has significantly relaxed its policies for the import of computer equipment and expertise, and is particularly interested in talking to European hardware companies on possible joint ventures in India on both hardware and software. Among the European companies sending representatives this time are minimakers Dietz of Germany and Computer Technology of the UK.

The Indian government is looking for dramatic growth in its small but flourishing computer industry, and recognises that to develop competitive software it needs the latest hardware. It has therefore relaxed hardware import restrictions.

It is also interested in manufacturing terminals and small computers, and is prepared to accept a much higher level of imported components than hitherto.

It is also keen to collaborate with European software companies on socio-economic projects which could be of benefit in India and also have export potential to other Third World countries.

COM bureau purchase

EUROCOM DATA, the international computer output microfilm services company, has bought a COM bureau in Helsinki from Systek Oy, a major computer services and software house. Eurocom is a subsidiary of the National Westminster Bank and already owns COM bureaux in Sweden, Denmark, West Germany and the UK.

Univac scores in Tokyo

THE Univac 1100 line continues to score in Japan and the latest order comes from the Taiyo Kobe Bank in Tokyo, which is spending \$10 million on a large-scale 1100/82 mainframe, due for installation this month. Univac is keen to expand its business in the banking and financial sectors and, as exclusively revealed in Computer Weekly (November 23, 1978) is hammering out an agreement with Bunker-Ramo under which Univac will recommend the latter's banking terminals to its financial customers.

Japanese firm's packet net

A PACKET switched network is being used to link different make computers in the Kyoto and Tokyo offices of Wacoal, a Japanese ladies' underwear manufacturer. The network was developed jointly by Wacoal and Digital Computer Co, a Tokyo-based systems house, and is claimed to be the first packet switched network to be installed in a commercial company in Japan. The network, which is capable of duplex transmission at 9,600

Just what the doctor ordered

A HIGHLY automated telephone ordering system for 80 chemists in the region around Hemlyn in Brunelwick, West Germany has been set up by pharmaceutical wholesaler Helmsberger. Based on a Modcomp II minicomputer, the key element of the system is the specially designed Pharmet terminal shown here. Prompted by the computer via a VDU, telephone order clerks regularly call each of the shops to get their orders for drugs and other supplies. But instead of reading out his order over the telephone, the chemist feeds a cassette of small plastic punched cards into a card reader on the terminal, and the Modcomp II makes up the order automatically on the basis of the number of items sold since the previous order.

Facit buys 50% of Dataroyal

SWEDISH computer peripherals and office equipment manufacturer Facit has bought 50% of matrix printer manufacturer Dataroyal of Nashua, New Hampshire, for \$1 million. Specialising in three-in-one printers capable of printing standard text, variable size characters and bar codes, Dataroyal was established by Royal Business Forms with key staff from Contronica. Royal retains 30% of the shares, the remainder being held by employees of Dataroyal. Dataroyal employs 75 people.

AT&T plea could put up US phone charges

THE US Federal Communications Commission has indicated that it would grant an AT&T request to speed up the rate at which its capital equipment is amortised. The effect on the telephone system user in the US which traditionally has been one of the cheapest phone services in the world, would be sharply higher charges.

Faster amortisation is essential to AT&T if it is to compete with thriving newcomers in telecommunications business like IBM and Xerox. The problem is that telephone equipment is typically designed for a long life span — anything up to 40 years. The net effect is that while IBM and Xerox have already depreciated their investment in the field, AT&T has only depreciated about a third of its enormous investment in telephone switching and hardware, currently valued at \$160,000 million.

Iraq contract for CII-HB

ALREADY well established in Iraq, CII-Honeywell Bull has picked up a significant new contract for a Level 800 mainframe from the university centre at Mosul, the city best known as the ancient Nineveh. It is the second largest university in Iraq, and each college will have its own terminal attached to the mainframe which will also handle work subcontracted from government bodies in northern Iraq.



COGARVIEW

Voice is coming... but mainly for input

needed to service a reasonably clear-speech voice entry system; share it.

A common voice input database shared between many subscribers to a single network is almost a classic demonstration of the power of the network as an operational tool.

The argument in favour of voice input, however, cannot rest only on the idealistic goal of natural interaction between

heads rather expensively but quite effectively with recording gear that would enter digital read-offs directly into the computer. But they were persuaded by Threshold Technology to have a go with voice input instead.

What happens now is that the inspectors read off the old pages aloud, so that data entry occurs simultaneously with the conclusion of one test and the

The Threshold 5011 systems in use at Continental Can cost \$10,500 each with 4K of random access memory, so it is not a particularly cheap option, especially when you count in the 24K Nova mini which acts as an intermediary between the voice recorders and the central 370 miniframe. But Continental Can is happy with the savings made, and so, on the figures they quote, would any company he.

Take Dialing Systems' voice recognition kit which, based on a PDP-11/04 mini with disc and high-speed vector processor, can simultaneously decode eight voice input channels, functioning much like a Touch-Tone decoder. Its first large-scale user, the Illinois Department of Administrative Services, anticipates making \$222,000 savings already in the first year through entrusting the routing and billing of credit card calls to the system, which can be accessed via 20 in-Watts lines and a fixed disc-based 21K Nova 1400-aided "Voice Base" telecommunications controller, and also employs voice response to verify credit card and destination numbers.

Communications giants AT&T and IBM are both wading into voice storage networks with their respective FRS and SFS systems in the US, and their early announcements already suggest that the real payoff of voice is likely to come in a security-minded environment where the system can be used for recognition as well as input.

Further advantages for networks, where voice pattern recognition can take the place of codes for access protection — one less hit of technological mystification for the user to worry about — also become clearly discernible.

The cost advantages of voice input seem bound to increase as the years go by.

Voice data entry equipment manufacturers pocketed some \$2.5 million from 1977 sales in the US, according to industry estimates — a relatively paltry sum which should quadruple by 1979, in step with the enhancement of the "vocabulary" of data entry terminals. Proof that such a trend is already underway is provided by a whole spate of new products on the market. Interstate Electronics Corp's unit, which boasts a 800-word vocabulary and sells for \$11,000-\$18,000, is one notable example. I am much less confident about the future of voice output, recent advances in audio response notwithstanding. It looks like an expensive gimmick. Reading output off a display comes a lot more naturally to users than entering data on a keyboard.

Whereas I am convinced that voice input breaks down barriers between man and machine, I strongly suspect that synthesised voice output actually interferes with the psychological rejection of the synthetic "voice" as an adequate representation of human speech.

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Applying yardsticks to your system's real performance

THE advantages of performance measurement by either hardware or software have, over the past couple of years, been points of contention. They would of course have been points of contention before that, except that it is only in the last couple of years that enough people have come alive to the idea of performance to make them contentious issues.

The arguments, briefly summarised, go like this. If you've got a hardware monitor you can fit it on to any machine you may be capricious enough to have installed — they are hardware independent, as the catchphrase goes. So if you have an ICL 2970 and an IBM Series 1, you're all right.

Also, a hardware monitor does not affect what it is monitoring, whereas the very fact that the software monitor is being used alters the normal running of the machine. For strict accuracy, you need a hardware monitor.

But by its very nature, a hardware monitor will give you only a restricted picture of what's going on in your installation. It can tell you, for example, which discs are being used, but it cannot tell you what is on those discs. It can tell you how busy a device is, but it cannot tell you whether having that device busy is a good or bad thing so far as any particular program is concerned.

In short, a hardware monitor just won't get at specific software functions. Take a software

queueing mechanism, where the queue consists of requests to look at a database. A hardware monitor will tell you that the input/output to the disc is 70% busy. A software monitor will inform you whether a 70% busy input/output device represents a blockage to the system as a whole, whether having a high number of requests waiting is a major problem.

In addition, say the software monitor proponents, the hardware monitor's connectability can be a liability. Because with each different machine you have installed — they are hardware independent, as the catchphrase goes — a task made more tricky by the fact that these connection points are frequently missing from systems documentation.

You have got to open up the back of the central processor and delve around; this task, if entrusted to ordinary hands, can result in rather expensive malfunctions afterwards. Properly, it should be entrusted to electrical engineers' hands, and these are often neither easy nor cheap to come by. Even then, it is not unknown for probes to be connected the wrong way round, thus resulting in, to say the least, measurement data that is slightly off.

But, reply the hardware advocates, it's all very well to sneer at the jack-of-all-trades approach — the software monitor is master of one. If you're not running on IBM, you're pretty well stuck, because while IBM

and independent suppliers have written monitors for MVS as well as the other IBM operating systems, there is hardly anything available for other manufacturers' equipment. Although in this respect it is fair to mention that ICL is looking to bring out a monitor for its 2900 series.

Of the two, hardware monitoring is probably generally more expensive, although you could start with either for about £5,000. It would not be an unfair general conclusion, though, to say that most of the data required for efficient monitoring can be produced through a software monitor sitting on five to ten cylinders of a disc.

Best known hardware monitor suppliers are Tesdata, Dynaprobe and Comres. Hardware monitors are really used most effectively on big sites, as well as for intricate jobs like special usages or special applications.

As mentioned earlier, performance measurement has only become an important area of computing over the past two years, although it has certainly been available for longer than that. What is the reason for the growth of interest?

There are various reasons, but the main one is that there has been gradually increasing pressure from outside computer departments to ensure that the costly resources are used efficiently — as efficiently as

possible resources throughout the rest of a company, such as typewriters, desks, the machines and people, are used.

It's all part of the process of demystification of the computer installation: the directors may not know exactly how it works, but they can compare its output with that of similar installations. If the result is not favourable, the measurement tools available will help even the non-computer man understand what is going wrong.

This is an important point: the print-out produced by measurement tools is looking less and less like the result of an involved calculation involving a book of log tables and the expected population of China on January 23rd, 2035. Increasingly, pictorial representations of results are being used to make analysis easier — bar charts, graphs and histograms, for example.

First Series 50

THE first Series 50 32-bit Prime computer to be sold in the UK is going to Sherwood Computer Bureau of Romford, Essex, the firm that runs a bureau service on ICL 1900 mainframes for insurance syndicates at Lloyds and associated firms of accountants. Sherwood will install the machine, with a London firm of accountants.

4300 service

THE big IBM data centre in Warwick is to provide comprehensive remote program development services under the VM/370 operating system. While they are awaiting delivery of their machines, customers for IBM's new 4300 series will be able to develop programs from terminals installed at their own premises.

By Nick Pollard

Performance measurement by either hardware or software has become a bone of contention in recent years. NICK POLLARD, manager of CPP UK, points out the advantages of having a yardstick applied to one's achievements.



Now comes chessboard that speaks each move

ADDING to its Chess Challenger range, Spectrum Marketing has introduced two new models — a seven level Chess Challenger, and one that speaks each move, eliminating the world's first speaking computer chessboard.

Called the Voice Chess Challenger, the latter model has about 10K of RAM and 128K ROM, and the makers say it will have "the strongest program to be placed in microprocessor" and be "as fast" as its other model.

As it has speech synthesis, operation of the device is simple by hand people. The Chess Challenger is £149.95 (October 5, 1978) and the Voice Chess Challenger is £299.95. Expected price for the Voice Chess Challenger, which is available in July, is about £349.95. The seven-level Chess Challenger Seven will be available in April at a cost of £100.

Also announced by the company is "astrology computer" called Zodiac, which generates individual horoscopes.

Planet positions at birth and corresponding natal characteristics are provided as are suggested action for any day "past, present or future".

Particular courses of action with regard to the present astrological conditions of individuals are given too. Available in June, Zodiac costs £25.95.

OPPORTUNITIES IN WALES & THE WEST COUNTRY

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To keep pace with their tremendous growth potential our clients, With Computing, a Software house, rapidly becoming a major force in the marketing and development of commercial Turnkey Systems specifically for DEC PDP Hardware, require the following:

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Working individually or in control of a small project team, the Analyst will predominantly be involved in the design of financial or commercial 'on-line' systems, although current development plans include the development of manufacturing related applications.

System design on a commercial Mini would be an obvious advantage, however, it is fully appreciated that the qualities required for this position will obviously apply to applicants from a mainframe environment.

Although as a Senior Analyst, it is unlikely you will be required to programme, as the emphasis will be on System Design and project control. It is vitally essential that potential applicants have some time programmed, if they are to fully appreciate the capabilities of the hardware in use.

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ANALYST/PROG

Working at an intermediate level, being involved in both Systems and applications programming, it would again be an obvious advantage if applicants had previously worked on a commercial Mini.

As a further alternative these positions may be of interest to a young Analyst wanting to move from Mainframe to a Mini computing environment.

PROGRAMMING SUPPORT

Within this group there are a wide range of opportunities. With a particularly interesting role in recruiting at various levels, experienced DEC PDP basic + or D-bol Programmer.

Also of interest would be young commercial Programmers, interested in Programming on DEC/PDP, or alternatively numeric/scientific/Computer Graduates wishing to become Telesis Programmers.

Applications for these positions will be only considered through Sanderson Executive. For further information please phone or write to Keith Dove, Sanderson Executive Recruitment, 8A Prince's Victoria Street, Clifton, Bristol 8.

UNIVERSITY OF EXETER LECTURER IN COMPUTING SCIENCE

Applicants are invited for a lectureship in the Department of Computer Science, Exeter, from 1 October 1979. Candidates should be qualified persons working in any area of computer science. Specialisation which are of particular interest, but which are not intended to make up an exhaustive list are: data base computation and theory, artificial intelligence, computer architecture and systems, theory of programming languages and semantics, operating systems, distributed computing and networks. Commencing salary will be within the range £3883-£4831 p.a. (under review). The post is subject to a probationary period not exceeding three years with the prospect of permanency thereafter. Further particulars may be obtained from Miss Graham Wilson, University of Exeter, Northcote House, Exeter EX4 4JG. In whose applications (highly motivated, overseas candidates only) should be forwarded by 8 March 1979. Please quote reference No. 3205.

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Application forms and further particulars from the Personnel Officer, University of Bath, BA2 7AY (tel. Bath 81244 ext. 700) quoting reference number 79/43. Closing date will be 5th March.

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Application form and further information from: The Chief Constable, Personnel Department, Devon & Cornwall Constabulary, Middlemore, Exeter EX2 7HQ.

Closing date for completed application 26th February, 1979

SOCIAL SCIENCE RESEARCH COUNCIL Database Management Systems Fellowship

Applications are invited for a two-year senior fellowship for work on the potential for social science research of database management systems in particular based on relational DBMS. The successful applicant will be expected to liaise with SSRC and to report on further steps needed to advance this field. Qualifications sought are a high level of ability in mathematics and statistics, knowledge of computing software, interest in training in the social sciences and willingness and ability to undertake social science needs. The appointment is expected to take effect from October 1979. The salary will be up to professional level but an appointment may be made at a more junior level, if appropriate. Payment of additional supporting expenses is negotiable with SSRC. The successful applicant, and the proposed institution, Applications close on 1st February, 1979.

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A degree in science, mathematics or engineering with knowledge of Fortran is essential. Significant experience is an advantage.

Programmer A Salary £3,400-£4,500

The successful candidate will have no previous experience, preferably in Fortran, and will be responsible for the operation of the terminal and for supervising the work of the junior staff.

Applications should be sent to: The School of Computer Science, Westminster Medical School, 17 Donsbury Road, London SW1W 9JX, enclosing a curriculum vitae and the name of a referee.

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Ref: 7/1

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Ref: 7/2

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Ref: 7/3

ANALYSTS and PROGRAMMERS Herts to £7,000+

This is a first class opportunity for RPGII/COBOL Analysts and Programmers to join a recently formed D.P. department developing commercial systems on an ICL 2903 in an on-line environment. For the junior positions at least 1 year's commercial experience is required while for the senior positions some systems analysis experience is essential.

Ref: 7/4

PROJECT LEADERS London to £7,500

A financial services organisation seeks Analyst/Programmers with experience of BASIC on PDP11 equipment to join their team, developing on-line, real-time banking systems.

Previous experience of team leadership, together with some commercial systems analysis is desirable together with the ability to communicate with users at all levels.

Ref: 7/5

COBOL PROGRAMMERS London/Holland to £15,000

An expanding U.K. based consultancy requires COBOL Programmers, educated to degree standard with a minimum of 2 years' commercial programming, preferably with some team leadership experience, to develop financial systems on a wide range of machines. There are excellent career prospects within the organisation and successful applicants will be expected to work in Holland for limited periods.

Ref: 7/6

ANALYSTS/PROGRAMMERS Saudi Arabia to £11,000 tax free

An expanding computer services organisation seeks Analyst/Programmers with at least 5 years' experience on mini-computers and a COBOL programming background to join their new division providing turnkey systems. The company offer excellent career prospects together with an attractive remuneration package. Initial interviews will be held in London in February.

Ref: 7/7

MINI/MAINFRAME PROGRAMMERS W. London to £7,500

Our clients an established British Group of Companies, seeks Programmers, Senior Programmers and Programming Consultants to provide software house services on mini and mainframe machines. Preferred experience includes IBM, ICL, Data General and Nova with some commercial programming experience.

Ref: 7/8

INFORMATIX UNITED KINGDOM AND OVERSEAS INDEX

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SENIOR BUSINESS ANALYST	CITY	to £9,300
PROJECT LEADER	ESSEX	£8,000 + RELOCATION

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ANALYST	HANTS	£7,000 + BONUS
ANALYSTS	KENT	£7,000 NEG.
ANALYSTS	CENTRAL LONDON	to £7,800 + BONUS + PERKS
ANALYST	SURREY	£6,500 + SUB MORTGAGE/PERKS
PROGRAMMERS	LONDON	£7,000 + PERKS

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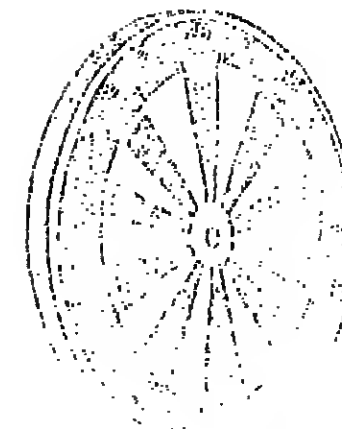
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Excellent Guarantees — Co. Car

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New products about to be launched and future plans will ensure not only very large incomes for successful candidates, but also excellent career prospects. It is intended that the initial intake of new personnel will form the management structure over the next year or so. Candidates should therefore have the potential to move into a more senior position within a relatively short time scale. Indeed, there is currently a SENIOR MANAGEMENT opportunity available, and all relevant applicants will be considered for this position.

We are interested to hear from applicants who have a sound business sense, capable of negotiating multiple sales at a high management level, with the drive and ambition to really succeed in this very lucrative market place.

Successful candidates will be offered a basic salary of between £6K and £8K (more if you can justify it), substantial income GUARANTEES and a genuine income potential of circa £17K. A company car or allowance will be provided plus other excellent fringe benefits.

This is a REAL opportunity for 1979 and beyond — DO NOT IGNORE IT!

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Our main requirement is for personnel who understand the working of the C.C.A. and who are accustomed to negotiating high value multiple contracts.

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An unparalleled opportunity exists for candidates with a sound business sense capable of negotiating multiple sales at a high management level with the "Times Top 1000" companies.

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For a confidential discussion please telephone or write to the advising consultant quoting Ref. No. DVW 79/4.

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We have been retained by a large British Mini Computer Supplier, with their sights fixed firmly on the future to find Hardware experienced, Lecturers and Technical Support Personnel. We can offer genuine career opportunities. Salary of £6-£8K plus profit sharing and a Company Car to the right people.

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"Most top people started in sales"

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A young and highly successful software consultancy with a rapidly expanding order book is now seeking COBOL programmers with around two years' + experience to help consolidate and develop new business in London and the south-east. Projects cover a wide variety of applications, mainly in the commercial sector, and offer plenty of scope to creative career-minded individuals. For further details please quote ref. CW232.

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Take advantage of our position as one of the leading recruitment specialists in the field of scientific programming. Today, more than ever, there is a demand for highly skilled personnel with the ability to tackle wide ranging projects in the design and development of scientific systems. If you hold a degree in a scientific discipline or have relevant practical experience of real time mini computer systems, using either ASSEMBLER, BASIC + MACRO 11, CORAL or FORTRAN, then give us a ring quoting ref. CW233.

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We are an Engineering Group with five operating companies in the Warrington area and we will shortly be installing an I.C.L. 2904/50 computer. This new appointment is based in Warrington and we are looking for a person (male/female) with both operator and supervisory experience who can demonstrate that they have the administrative talent to become Operations Manager within 12/18 months of first appointment.

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Establishment Officer
University College, CORK, Ireland.
Closing date for receipt of completed applications: Friday, 9 March, 1979.

PROGRAMMERS YOU NEED TO BE QUITE A CHARACTER TO WORK FOR US

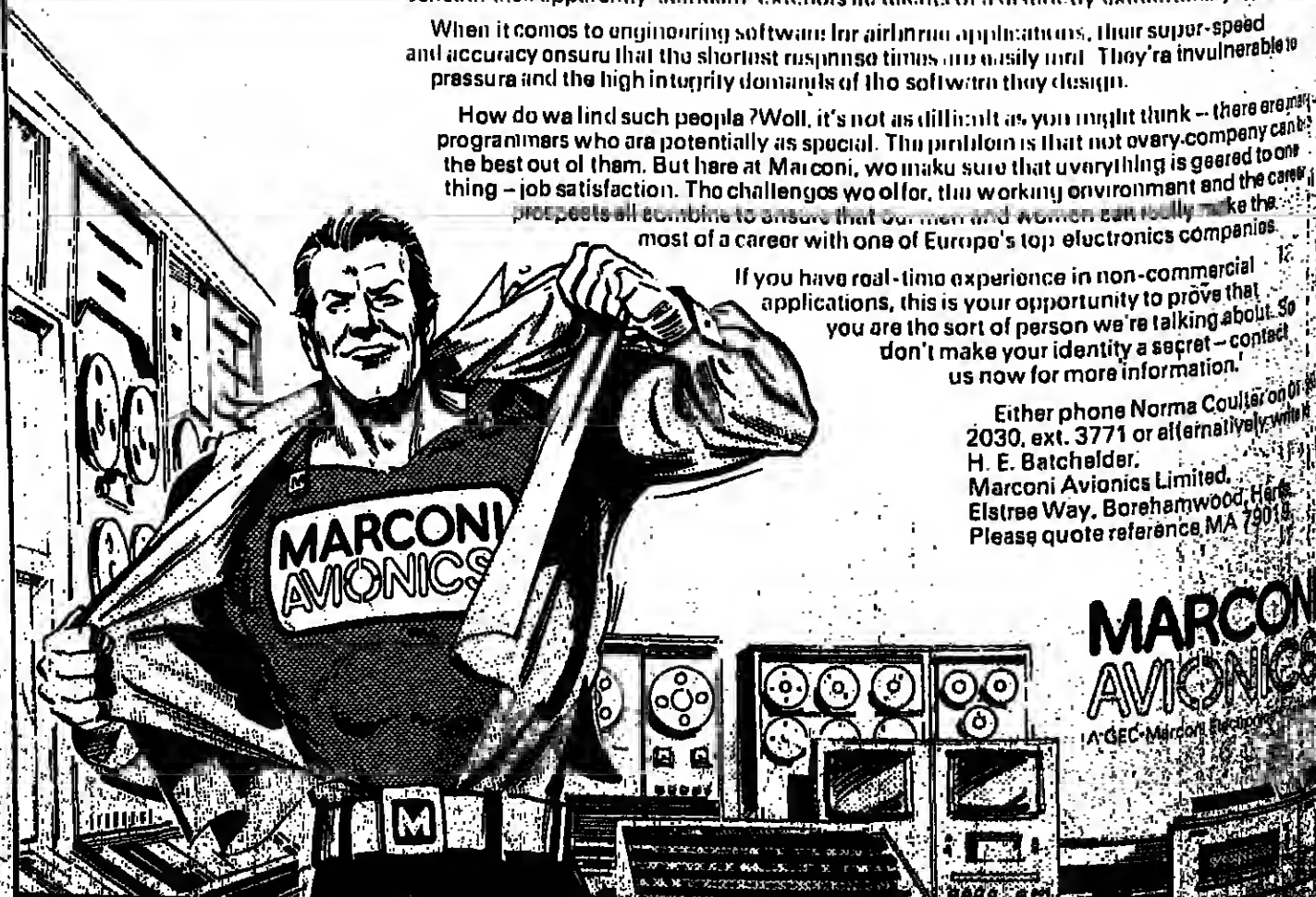
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SCOTLAND

The Company is NCR, one of the top 3 computer systems companies worldwide for sales revenue and software development budget.

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The job will be based in Dundee on Tayside. Housing is economically priced and of a very high standard. Other social amenities — e.g. schools — are of a standard to compare with anywhere in the UK. The company offers comprehensive relocation assistance.

In the first instance, contact, in complete confidence, A. P. BAKER by phone (01-499 4501) or by letter at the address below. He has full details of the company, the job, and the location.

Ref. RW 6/2

PRODUCT MARKETING MANAGER LEADING

★EUROPEAN MANUFACTURER★

The job is to take full business responsibility for a range of established products and to handle new product proposals from start to finish. In addition, the Product Marketing Manager will be expected to develop and co-ordinate detailed business plans, and ensure the total success of all business objectives.

Both depth and breadth of experience in the computer industry are essential prerequisites for success in this job. It is likely that this experience will have been gained in a variety of sales, marketing and technical roles. Maturity, discretion and sound commercial judgment are all fundamental qualities.

The company, located in the London suburbs, is in the vanguard of hardware technology, and intends to enhance this position. This is, therefore, an important appointment and this will be reflected in the remuneration package.

Contact: A. P. BAKER, Managing Consultant.

Ref. 6/1

PROGRAMMERS

FOR

MICRO PROCESSORS

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You do? — then how about

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Ref. RW 6/3

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Thursday 22nd February 1979 4.30 p.m. - 8.30 p.m.
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Please ask at reception for Ivor Norton.

If you cannot accept this invitation please telephone to make an alternative appointment.

Ivor Norton Management Services Ltd
Recruitment Consulting Division

P.O. Box 63, Copthall Tower House, Harrogate HG1 1TS. Tel: Harrogate 66628.

USA

Successful applicants will possess as a minimum requirement, working experience in IBM OS/360 together with associated JCL and dump-reading skills. Of these applicants, preference will be given to those who have experience in on-line IMS (DL/I) programming. Consideration will also be given to OS/360 experience coupled with any of the following: OL/I data base design, IMS (DL/I) batch programming, CICS, PL/I and Assembler.

Salaries from £7k to £13k depending upon level of experience, plus relocation reimbursement possibilities.

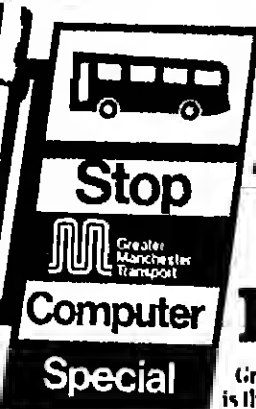
Informal interviews will be conducted in London in a few weeks. Appointments may be made by writing as soon as possible with a curriculum vitae to Payne Consulting Services Inc., 38 Cese Square, San Francisco, California, 94110, U.S.A.

UNIVERSITY OF EDINBURGH
Program Library Unit
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Applications are invited for the above post which is offered for one year in connection with an SRC sponsored investigation into the optimisation of large programs on ICL 2900 series computers.

The work will involve studying the interaction of the packages with the operating system and the programming of sections of them. A computer science graduate would be preferred but other graduates with adequate programming experience will be considered.

The salary scale is £3384-£4992 per annum.
Further particulars are available from the Secretary to the University of Edinburgh, Old College, South Bridge, Edinburgh EH8 8YL. In whom applications should be sent not later than 28th March, 1979. Please quote reference 9007.



A TAILOR-MADE PACKAGE FOR DP SPECIALISTS

Greater Manchester Passenger Transport Executive is the largest passenger transport operator outside London, serving 2.4 million people and covering 800 square miles. The Systems and Data Processing Department is now undergoing major expansion. If you are an ambitious DP specialist, join the team and you'll be getting more than just a top salary. Analyse the package for yourself.

SYSTEMS DESIGNERS
To £6,800

To design and implement cost-effective applications within the Corporate Systems Development Plan.

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To £4,500

Free Travel

By rail, to and from work, by bus at all times, including weekends: a saving that could be worth hundreds of pounds a year.

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NALGO membership brings you privileges like discounts over a very wide range of goods and services, including car insurance and H.P.

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There's a very lively sporting scene, including cricket (Old Trafford), soccer, rugby, tennis, squash and golf. Rent beer. Thriving clubland. Home of the Hallé.

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To prepare program structure specifications, and supervise programming in implementing them.

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To write mainly COBOL, but some FORTRAN. Countryside

Some of Britain's most beautiful countryside is within easy reach. Including the Lake District, Peak and Snowdonia national parks. And Manchester and its satellite towns: some of the finest shopping outside London.

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We give you generous help in moving up £750 to cover the sale of your old house and purchase of the new temporary lodging allowance, time to house-hunt, etc. And possible to live on the edge of the county only 10 miles from the City centre.

Send application in a request for further information to:

Mr. A. H. Smith, Recruitment Manager
120 ALBANY ROAD, MANCHESTER TRAVEL SERVICE
2 Devonshire Street South, Ashton, Manchester M12 6BN.

PROGRAMMER

£4200-£6200 p.a. Stockport

The Central Electricity Generating Board invites applications for the above position in its Computer Branch.

The job is in a team which provides a computing service to power stations and involves working on the Region's central computer (ICL 1904S) to be replaced by 2960 and 1980 plus location's own machines (Ferranti, G.E.C. D.E.C.). The team is based at Braham, Greater Manchester, but assignments elsewhere may take place from time to time, e.g. North Wales or North Lancashire.

Applicants should have 'A' level maths plus two years' appropriate experience preferably on COBOL and/or FORTRAN. Knowledge of GEORGE 3 and/or VME/B operating systems and teleprocessing plus REAL TIME experience would be an advantage.

Applications in writing from either sex, giving details of age, experience, etc., to the Personnel Manager, Europe House, 61rd Hill Lane, Chesildale Heath, Stockport, Cheshire SK3 0XA, to reach him no later than 21 February, 1979. Please quote vacancy No. 402/CW.



THE OPEN UNIVERSITY
DATA PROCESSING DIVISION

COMPUTER OPERATORS

up to £3,800 (including shift allowance)

The University's rapidly expanding Data Centre provides support in the administrative and operational units of the University which now has approximately 70,000 home-based students. Promotions have created vacancies for UNIVAC 1100 Operators and applications are invited from persons over the age of 18, dedicated to 'A' level standard and who have up to one year's experience in major operating systems.

We offer: Career development opportunities; Training, including day release for computing studies; Good holiday provision; Sport/social facilities; Rural location with houses available to rent or to purchase at reasonable prices.

Application forms are available from The Recruitment Office (J03465/3), The Open University, P.O. Box 75, Milton Hill, Milton Keynes MK7 6AL or telephone Milton Keynes 83868 (24-hour answering service).

Closing date for applications: 21st March.

Business Systems Analysts

Rural Surrey
c.£8,500, plus significant benefits

Our client is a major British organisation with a turnover currently exceeding £400m and a planned investment in 1979 in mainframes and minis, utilising distributed communications architecture, in excess of £2m.

Operating in a rapidly expanding information systems development environment, the management services division wishes to recruit a number of Business Systems Analysts who will be involved in the investigation, development and implementation of a wide range of financial, marketing, manufacturing, and distribution control systems utilising database, distributed processing and real time technologies.

Our client is interested in meeting people who possess a background of experience in systems analysis, design and implementation coupled with some previous exposure in organisation and methods or programming. He is looking for people experienced in communicating with users in their own language, and able to translate their needs into documented and specific processing requirements. Where appropriate he will provide adequate training in advanced DP technologies to enable the successful applicants to operate effectively at all levels in these appointments in terms of performance and future career opportunities.

For the more senior positions he would consider salaries above the quoted figure and would thus expect a high degree of DP application systems development knowledge and experience at project leader level.

Applicants should be educated to at least 'A' level in two or more numerical subjects, and possess adequate potential for a full career development into the general or technical management stream.

Depending on the depth and width of experience, successful applicants will be offered excellent starting salaries up to and around £8,500, coupled with a range of significant benefits. Appropriate relocation expenses will be awarded.

TO APPLY, please send a ONE PAGE, handwritten or typed, listing of, name, address, age, marital status, home and office telephone numbers, current salary and employer, employment history, including positions held, roles played, relevant responsibilities, and hardware and software systems exposure to date, to ANTHONY SPURR, Management Recruitment Division, quoting reference number G988. Applications are invited from either sex, and will be treated in the strictest confidence.

BIS Applied Systems Limited
York House, 199 Westminster Bridge Road
London SE1 7UJ
Telephone: 01 633 0866



HARRIS COMMUNICATIONS INFORMATION SYSTEMS
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Our rapid expansion of our Customer installed base is creating two experienced Field Service Engineers to work in London Area. Candidates should preferably have mini-computer experience with a knowledge of Peripherals including Magnetic Tape Drives, Discs and Visual Display Units.

Worthing

- * A competitive salary
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If you are interested in a worthwhile career and a challenging environment, please write or telephone to:

Mr. D. Hyams (Field Engineering Manager)
HARRIS SYSTEMS LIMITED
145 Farnham Road, Slough, Berkshire, SL1 4JQ
Tel. 0753-34888

USA

PROGRAMMER/ANALYST/PROGRAMMER

- * \$18,000 to \$30,000 depending on experience
- * Excellent company paid benefits
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SDA, a highly respected computer consulting company, is rapidly expanding in New York City. We require individuals with a minimum of 3 years IBM 370 experience (or equivalent) and a degree, to join our current staff of 250, for assignments in systems design, applications programming and data processing. These assignments will be initially for 18-24 months with the possibility of participating in our (earnings) plan upon return.

To arrange a confidential interview (no agencies) in New York City, send your cv, with telephone number (reverse charges) to: Roger Berne on 0212 691 1314/15 between 10am and 5pm.

SOFTWARE DESIGN ASSOCIATES
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Dorset House, Stamford Street, London SE1 9LQ

Programmers, Analysts & Software Engineers.

We'll show you the ropes in our top European training ground for Middleweights.

It's on the London Kent border at Fooks Cray and run by us — IDEC — the software development muscle behind I.T.T.'s Business Systems and Communications Group.

Our daily work out involves developing software support systems and producing software for I.T.T.'s wide range of products.

We're at the top of our class and because we intend to stay there, we're continually looking for new talent.

Contenders — male or female — must be high level language, DP or Real Time Programmers/Software Engineers with middle-weight experience who have the ambition and ability to move into the heavy-weight class.

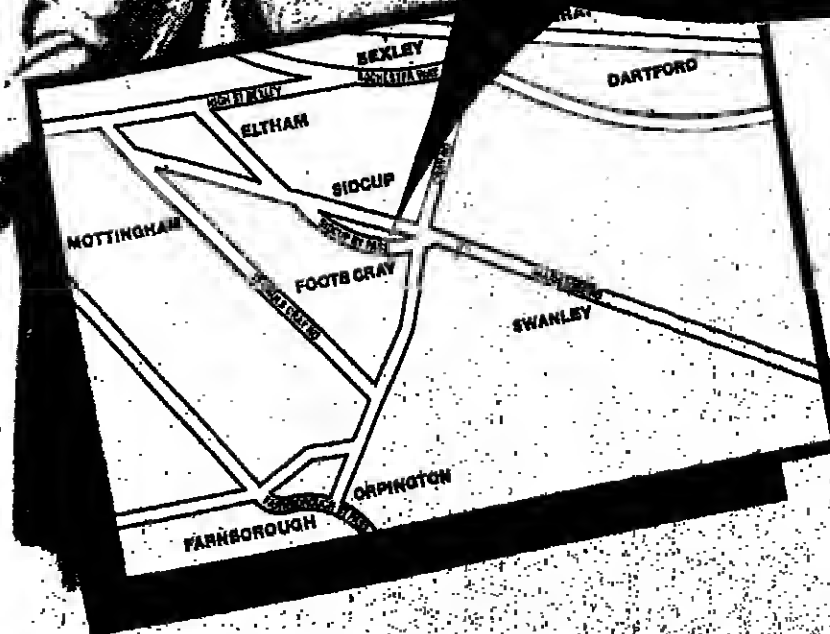
We can offer them a substantial purse — worth up to £10,000 p.a. entirely dependent on experience and potential — backed by a full fringe benefits package... featuring 23 days holiday, subsidised meals, flexible hours, pension scheme and big discount on company products.

We can also offer them the chance to further develop their talents and explore their strengths within a tough, competitive, absolutely professional environment. And to make a name for themselves in 'state-of-the-art' software development.

If you're keen for a bout with a major, successful company, simply write or phone to get the facts.

Contact Keith Gent or Jeff Perry on (01) 300 7788 ext. 3673, or best of all, call in any time between 10am and 8pm on Tuesday 20th or Wednesday 21st February, at: IDEC, I.T.T. Site, Maidstone Road, Fooks Cray, Sidcup, Kent.

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A Development Centre of
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W:2 NO SHIFTS £3300

If you can offer six months' experience of operating an IBM mainframe, and are now seeking to move into an interesting installation with No Shift working, this position provides an ideal opportunity.

An international advertising organisation is currently seeking an Operator to be responsible for the efficient processing of all production work. The company's H.Q. is at Bayswater, but their computing facilities are based in Brentford. You will therefore need to make regular trips between the two centres for which transport will be provided, and in addition to the normal range of operating duties you will become involved with job make-up and fault tracing in error situations.

This is an ideal opportunity to progress your career within a small but enthusiastic team, and gain valuable experience in an installation which will rely upon your ability and initiative.

Ref. SW1/1502

MYRIAD APPOINTMENTS LIMITED Computer Personnel Consultants
Telephone or write to:- 30 Fleet Street London EC4Y 1AA 01-353 0981 (24 hrs)

Systems Analysts

The Management Services Department at our Group Headquarters in York has openings for:-

Sales and Marketing Analyst

to carry out non-routine investigations. Recent projects have included assessing the effectiveness of our advertising and merchandising and organising the efficient deployment of the sales force.

You should have one to two years' experience of systems analysis or related work or have a sales/marketing background and be considering a career in systems analysis.

Personnel Records Analyst

to work in a team of six on the development of payroll and personnel records systems. We are looking for an analyst with one to two years' experience of systems work. Your particular experience need not be in that area as full training will be provided.

The equipment we are currently using includes an IBM 370/148 and 370/158 although later this year we will be running an IBM 3032 and 370/158. Our main programming language is PL/I and our operating system is VS1.

For both positions we are interested in graduates who ideally have some knowledge of statistics or economics. More importantly we are looking for the analytical, technical and personal skills necessary to carry a project through from an embryonic idea to a functional system. If this can be backed up by imagination, self reliance and an inclination to tackle demanding and challenging projects so much the better.

Starting salaries will be competitive and will reflect current market rates. In addition there are good prospects for promotion within Management Services and into other areas of the company. Other benefits include profit sharing, sick pay and pension and life assurance schemes.

If you are interested in either of these posts, please write or telephone York (0804) 53071 ext. 2011 for an application form, quoting ref. FY.628, to Miss D. M. N. Dick, Staff Office, Rowntree Mackintosh Ltd., York YO1 1XY.

Rowntree Mackintosh

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SURREY Senior Salesman (Milk) £15,000 package + Car
SURREY Systems Consultant (IBM Exp.) £27,500 + Car
HANTS Analyst/Programmer (IBM Exp.) £29,000
HANTS Systems Programmer (IBM Exp.) £27,000
SUSSEX Senior Analyst £25,000 + Car
SUSSEX Programmer £25,000 + Car
SUSSEX Analyst/Programmer £25,000

See William B. Smith on the computer market (Continued today) For an early interview

William B. Smith
Computer Personnel Consultants
25, Abchurch Lane, London EC4N 3DF
Tel: 01-403 8888

CITY OF BIRMINGHAM EDUCATION DEPARTMENT

JOHNSVILLE COLLEGE OF FURTHER EDUCATION
Kings Road South, Birmingham B31 8AJ
Tel: (021) 475 6211

LECTURER I IN COMPUTER STUDIES/DATA PROCESSING

Required to teach:
GCC Computer Science at 'O' and 'A' levels
GCC Data Processing for the Threshold Scheme
Computer Programming/Operating for Overseas Government-sponsored students
Data Processing for BSC and TSO students

The initial contract will be for one year from 1st January, 1979.
Part-time posts are also available in the above subjects.
Salary: £5,114-£5,334 including pay supplements.
Consideration will be given to qualifications and experience.
Applications should be sent to the Principal, Kingsville College, Kings Road South, Birmingham B31 8AJ.

Administrative Programmer

Rutherford Laboratory

We need a Programmer for administrative applications to join our Computer Department at Rutherford Laboratory. The work involves administration of scientific research sponsored by the Science Research Council.

If you're a 1900/2300/4400 Programmer, you could be the person to work with our programming team on our current conversion project. We are in the process of re-writing batch programmes on ICL 2100 A/S machines, to run interactively on an ICL 2100 computer using T.P. and Data Base Software. The 2100 is situated at Rutherford with links to SRC Central Office at Swindon.

Applicants must be acquainted with PL/I, AN/400 and/or 2803/4 systems, and be prepared to develop applications of computing hardware, software and graphics resources within the sphere of administrative computing.

Depending on qualifications and experience, grading and salaries are:-

Scientific Officer £3037-£4721

Higher Scientific Officer £1388-£2829

There is also a non-contributory superannuation scheme. The Rutherford Laboratory is situated on the Berkshire Downs, about 18 miles south of Oxford. It has its own restaurant and recreational facilities, shops, banking facilities, hotels and further sports and recreational clubs are available on the adjoining A.R.E. Harwell site. Assisted daily travel is available from most of the neighbouring towns and villages direct to the laboratory.

Contact Jane Griffiths in the Personnel Group on Abingdon (0235) 21900 Ext. 510 or write to her quoting reference VN775. Closing date for applications 2nd March 1979.



RUTHERFORD Science Research Council

Rutherford Laboratory, Chilton, Didcot, Oxfordshire OX11 0QX. Tel Abingdon 21900

The National Coal Board carries out an ergonomics programme which covers all the important ergonomics areas relevant to underground and surface mining operations. The work is carried out in the Ergonomics Branch of the Institute of Occupational Medicine, based at Stanhope Groby, near Burton-on-Trent. We currently have an opportunity for a

Programmer/Analyst near Burton-on-Trent

The successful applicant will work on the ergonomics research programme by the development and implementation of a mini computer system in an environment involving real-time applications and some data processing. Data arises from physiological and physical measurements and environmental investigations and is processed either directly or in pre-recorded form.

Candidates will be familiar with the software and hardware aspects and have an interest in developing the system to other aspects of the work programme. The current application of the system configuration is: System a) DEC PDP 11/10, 32 K memory, 3 Disc Drives, Analogous I/O module, Digital I/O module, Drum Plotter, Decwriter, A VDU, System b) DEC PDP 11/10, 24 K memory, Fixed Head Disc, Digital I/O module, Dual Cassette Drive, Teletype. Current operating system is RSX-11M with MACRO-11, FORTRAN IV AND BASIC +. Training and experience in on-line computing, preferably involving PDP 11s, will be required.

Starting salary, depending on experience and ability, will be within the range £4400 - £5750 or £3850 - £5000. Excellent benefits include nearly six weeks' annual holiday excluding public holidays.

NCB Please apply to Area Staff Manager/Secretary
National Coal Board,
Scottish Area, Green Park, Greenend, Edinburgh EH1 1JF

CLASSIFIED COPY

All classified copy should reach our offices no later than Monday preceding Thursday's publication (if submitted supplied 12 noon on a Tuesday).

Ring David Abbey for further details on 01-261 8014

LOLA

(LONDON ON-LINE LOCAL AUTHORITIES)

provides computer facilities to four London Boroughs. A in network serving 40 machines is used for on-line interrogation and updating of databases running under IMS/VS. Current equipment is based on a 4-megabyte 370/158 using VS1. A major enhancement of hardware - including an Attached Processor - and conversion to MVS will take place this summer. Currently vacancies exist for:

Database and Application Support

£4,500-£7,100

The Applications Support Group offers the opportunity for experienced programmers to expand their skills without having to become other Systems Analysis or Systems Programmers. The Group's major responsibilities cover:

- Design, creation, maintenance and performance of databases
- Development and support of application-independent user facilities and programs
- PL/I support for Project Development and Maintenance Programmers

The work covers a range of activities from dealing directly with end-user requirements to understanding O/I internals

Applicants will fit considered for posts in three salary ranges

£6,465-£7,146

£6,012-£6,345

£4,530-£6,180

IBM and PL/I experience are necessary - a knowledge of O/I would be an advantage. Training will be given where necessary both to fill gaps in initial experience and to keep pace with developments in computing

For further details of these posts contact Olive Doyle (Applications Support Group Leader) on 01-366 6611 Ext. 248 or Tony O'Brien (Systems Manager) on Ext. 244

Systems Programmer

£6,000 plus

Technical Support Group already has seven staff busy working towards the conversion to MVS this summer, whilst continuing to support VS1 and IMS/VS. Additional projects include the use of TSO and RJE later this year.

Previous systems programming experience is desirable but not essential as all necessary training will be provided. Applicants should be experienced programmers with at least two years working in a VS1 or MVS environment.

Salary scale is £6,012-£6,345 but consideration will also be given to applicants on a scale of £4,500-£5,800.

For further details contact Noel Saml (Technical Support Group Leader) on Ext. 285

Application forms from

Mrs B. L. Oorington

LOLA

Tower Point North

Steyn Road

Enfield, EN2 8UE

Telephone 01-366 8611 Ext. 278

Closing date for receipt of completed applications is

28th February, 1979

SENIOR ANALYSTS

£7-8000

Of commission, currently decentralising its computer operations to European and Middle Eastern sites, requires analysts with personal to manage a D.P. centre after six months of base. Work will involve processing inventory systems and reviewing systems. C 10000

PROGRAMMERS

To £6500 + car

All levels of programming staff are required for a new DP installation, preferably with experience of RPG/COBOL using VDU, MICRO-HEATS

SENIOR ANALYSTS

To £7500 +

Progressive international organisation offers opportunity of controlling project teams of analysts in an environment of work. Prospects of promotion to project leadership is envisaged after six months with financial rewards. WEST OF LONDON

PROGRAMMER/ANALYST

C. £8000

A leading European services organisation requires three years' experience of programming commercial applications, some systems implementation and knowledge of COBOL and System 370 ASSEMBLER languages for this position. You will review the DP Manager in system design and implementation program writing, monitoring documentation etc. E HERTS

Please phone for an application form

AMES PERSONNEL

Employment Agency Suite 14, Dryden Chambers,
119 Oxford Street, London W1A 1PA Tel: 01-434 1006

Coral 66 Programmers, Analysts

London & H. Counties
£6-8.5K

IMS (DB/DC) Applications & Systems Prog/mrs

S.W. London & E.E.C.
U.K. £7-9K
E.E.C. £12-15K

Database Designers & Trainees

Central London
£7-9K plus
overseas travel

Software Support Analyst

Frankfurt
£12K + car

Mini-Micro Software

Holland
£11-16K

Classifieds

Tel: 01-409 0468



360 Oxford Street,
London. WIN 9HA.

A British Multinational corporation has several senior openings in their London and numerous Home Counties offices. They require Analysts, Systems Designers and Analyst/Programmers with PDP11 backgrounds. Ideally some of the senior applicants will have military systems backgrounds and/or distributed processing experience. Whilst these positions are permanent there are several vacancies for contract

programmers. Salaries and associated fringe benefits will reflect the importance which our client places on the acquisition of these key personnel. Emphasis will be placed on depth of previous experience and stability in job progression throughout your career. Interviews will be held at the clients office or at your work or home location. Ref M-77A

An International client with an enviable reputation in the application of IMS (DB/DC) to advanced commercial and technical areas has openings in South West and Central London and the E.E.C. Applications Programmers should have extensive COBOL or PL/I experience and have worked under IMS for a minimum of 2 years. You will be given every opportunity to develop your skills within an environment which will encourage you to contribute ideas and expertise and where

personal recognition is expressed in tangible terms. You will be expected to shoulder responsibility and motivate team members working under your supervision. Salaries will be scaled to reflect not only your achievements to date but also your potential. Serious consideration will be given to applicants who have previous experience of larger financial systems under IMS. Interviews will be held in London as soon as applications are received. Ref M-77B

An International client is seeking Database personnel for their London office. They are entering another major expansion phase for which they require additional Database expertise including Project Leaders, Systems Designers, Analysts and Senior Programmers as well as academically high standard trainees. The former should be skilled in either PL/I, COBOL, Assembler or Mark IV. Both Database and Data Communications experience would be welcome. Applications are varied but

include Banking systems, Airline booking and Stock control. Not less than two years' D.P. experience will be considered and for more senior positions 4 years is the minimum. U.K. based personnel may have frequent opportunity to travel to Europe and the U.S. (if desired). Salaries need-to-say are going to be well above the norm in keeping with the client's prestige and the importance which they place on the acquisition of these key personnel. Ref M-77C

Would you like to join a major Mini Computer manufacturer in Holland? The company itself is a U.S. based international corporation with offices in five continents. They specialise in the supply of Bespoke turnkey systems based on Mini and Micro processors specifically in the Communications, Message Switching, Network, Process Control and basic software fields. Any Assembler language and experience of PDP11, D.G. or H.P. is desirable. To meet their expansion goals they are creating

numerous additional specialist project teams requiring Consultants, Project and Team Leaders, Analysts and Programmers at various levels, specifically at 5 years plus to 2.5 years of experience up to 2 years. If the idea of working at the sharp end of sophisticated technical computer planning appeals and joining a very prestigious company is meaningful in your career development then you must give serious consideration to these opportunities. Ref M-77D

An Important U.S. International Mini-Computer manufacturer requires for its Frankfurt office a Senior Software Support Analyst to assume responsibility for special projects and assist field engineers in solving systems difficulties in addition to evaluating proposals and technical presentations. A certain amount of European and U.S. travel will be called for and a car will be supplied by the company. Product training will be given at the Company's U.S.

headquarters. A strong working knowledge of COBOL and Fortran is necessary and experience of either Assembler, Basic, RPG and Systems Programming would be useful. The indicated salary of £12,000 is not final, if exceptional experience indicates otherwise. Excellent fringe benefits accompany the package. Interviews will be held in the U.K. as soon as applications are received. Ref M-77E

N. GERMANY - Mini Assembler analyst-programmers preferably with aerospace or defence background DM48,55,000 p.a. Permanent full time contract available. Ref M-77F

CICS Analyst Programmer. With either COBOL or Basic experience. Reading based, a two-year contract. Salary dependent on experience by £2,250. Financial systems background preferred but not essential. Ref M-77J

BASIC PROGRAMMERS with either commercial or scientific backgrounds, required by Important Central London based Client. Permanent or contract positions available at salaries of £5.8K to £235 p.w. up. Ref M-77G

BERKSHIRE/HANTS BORDER - Micro-specialist Intel 8080 Zilog 2501 required by turnkey systems supplier. Established U.K. company offers outstanding career positions. Salaries to £8K +. Ref M-77K

HARDWARE ENGINEERS (Minis) with a desire to work in the training division of a major Mini computer manufacturer based in Berks. Product training giving in the U.S. Salary up to £8.5K. Ref M-77H

DENMARK + GERMANY - IBM IMS and/or Univac 1100DMS applications exposure required for early start. Prefer permanent career person but consider contract. Ref M-77L

BRUSSELS - T.P. and O.B. Applications and Software Programmers. Prefer IBM software. Full relocation expenses and vast range of real company benefits whilst salaries to £16K. Interviews at our London office. Ref M-77I

GCOSTDS - Applications Consultants required by major British Systems Group to be based in one of their European offices. Salary £12K + expenses. Ref M-77M

HOWARD

HARDWARE/SOFTWARE TESTING SYSTEMS ANALYST

BELGIUM, C £25,000 P.A.

Five months of a year required well into 1980 to supervise development and testing of software/hardware testing of a military communications project. Software applicants should have real time experience, particularly RSX and Micro. Some experience of drivers would be useful at would testing experience, or exposure to microprocessors. Experience with experience covering both hardware and software particularly considered. Tel. 02240172

The Overseas Recruitment Consultants
HOWARD ORGANISATION INTERNATIONAL LIMITED
Employment Business Section
8 Euston Way, Harewood Park, Harrogate, North Yorkshire, YO1 1AA
Tel. 01483 5088

QUEEN MARY COLLEGE

University of London

COMPUTER SCIENCE AND STATISTICS DEPARTMENT

RESEARCH ASSISTANT/DEMONSTRATOR

required, who will be expected to participate in research into new computer applications and assist with teaching in the Department's Computing Science curriculum

Applicants should have a good honours degree in mathematical science and a sound background in both theoretical and non-theoretical computer science. Experience in programming, particularly with Algol-68 or Pascal, is a definite advantage. Initial salary is £3,500 p.a. plus £450 London allowance. Please apply by letter with curriculum vitae and names of referees to the Registrar, Queen Mary College, Mile End Road, London, E1 4NS

UNIVERSITY OF ESSEX

RESEARCH OFFICER

IN THE DEPARTMENT OF ELECTRICAL ENGINEERING SCIENCE

Applications are invited for the post of Research Officer in the above Department. This post, part of a small team concerned with researching into improved methods of programming computer controlled telephoned data switching systems, is funded by the British Post Office until October, 1980. Appointment will be for one year in the first instance. Applicants should have a degree in computer science or equivalent experience. Knowledge of Pascal and/or graphics would be an advantage. The group uses a PDP-11 under UNIX as well as a large DEC system. Salary on Range 1B scale £3,384-£4,882 (under review).

Applications (two copies), including a curriculum vitae and the name and address of two referees, should reach the Registrar (A/E/55/CV) at the University of Essex, Wivenhoe Park, Colchester CO3 3SQ, before 15th March 1979. Shortlisted candidates will be invited for an interview.

PROGRAMMERS IN HERTS SOUTH HERTS TO £6000

Programmers with the desire to develop their careers, having already gained approximately 2 years' COBOL experience, should now consider the existing opportunities offered by our client:

- * Program development in an ON-LINE environment.
- * Involvement with POINT-OF-SALE terminals and mini's.
- * Realistic opportunities for progression to SYSTEMS ANALYSIS or TEAM-LEADING on small projects.
- * Formal training, where necessary, in specialised software techniques.
- * Staff discounts on company products.
- * Generous holiday entitlement.

To learn more about these and other development projects, a short telephone conversation could be the beginning of a bright and rewarding career.
Ref. N1/1502

DATABASE DESIGNER

BUCKS To £7000

Due to the development of several IMS real-time applications our client is seeking an experienced Analyst or Analyst/Programmer with knowledge of database systems. Functioning in a consultancy role to several applications teams, the successful applicant will gain extensive IMS exposure, together with the opportunity to co-ordinate and influence the design and development of on-line real-time projects.

Applicants should have a sound academic background, and should be capable of original and innovative thinking in relation to the design and use of database software. Experience of on-line systems together with knowledge of data structure analysis would be of particular relevance.

The Company offers excellent conditions of employment, including five weeks' holiday, an excellent starting salary and relocation assistance where necessary.

Ref: E1/1502.

COBOL PROGRAMMERS

WEMBLEY £5000 to £6500

If you have approximately eighteen months' sound COBOL experience gained in a commercial installation our client can offer you excellent opportunities for programming career development.

The company has a progressive approach to computer systems development based on its IBM hardware and is introducing a range of on-line systems.

Although IBM experience is desirable candidates with other mainframe experience will be considered. Successful applicants will have the opportunity to use an inter-active programming language for which full training will be given.

Our client offers a considerable benefits package which is commensurate with a highly successful business operation.

Ref. No. NW1/1502.

SYSTEMS ANALYSTS

N.W. LONDON £5500-£7000

We are seeking to recruit experienced Systems Analysts with good business skills who wish to consolidate their careers within a major, international organisation. A wide variety of systems, some of which form part of complex, multinational projects, are developed on the latest IBM equipment at modern, purpose-built offices.

The Analysts will be responsible for small systems teams and may be involved in the planning and control of several minor projects running concurrently. Additionally, the Analysts will prepare business proposals/cost and benefits appraisals, co-ordinate project development and estimate project requirements.

Employee benefits are commensurate with other major organisations and include re-location expenses, an excellent staff restaurant and a very active sports and social club.

Ref: S1/1502.

MYRIAD APPOINTMENTS LIMITED

30 Fleet Street London EC4Y 1AA

01-353 0981 24 HRS.

Technical Editor

Berkshire £4000+

We need an editor to help produce computer support manuals. The ideal candidate will have at least 2 years' editorial experience that includes contacts with authors and printers. Knowledge of computer systems will be an added advantage, although training in ICL systems will be given.

The position is based in new offices at Wokingham in rural Berkshire, and forms an ideal springboard for a satisfying career with Europe's leading computer company.

Write to or telephone Don Muhl, ICL House, 80 Beach Street, Wokingham, Berks RG11 1PB. Telephone Wokingham (0734) 790512. Please quote reference CWT1252.



think computers - think ICL

COMPUTER PROGRAMMER

The Company: Kirkstall Forge is one of the world's leading manufacturers of Heavy Duty Axles.

The Computer: We have just installed a Honeywell Level 84/30 Computer with 4 x 70 Mb discs, 384 K of memory and interactive program development.

The Job: We need a good COBOL programmer with 12-18 months' experience to be immediately productive in our expanding programming team. Preference will be given to candidates with proven skills in communications and/or database techniques.

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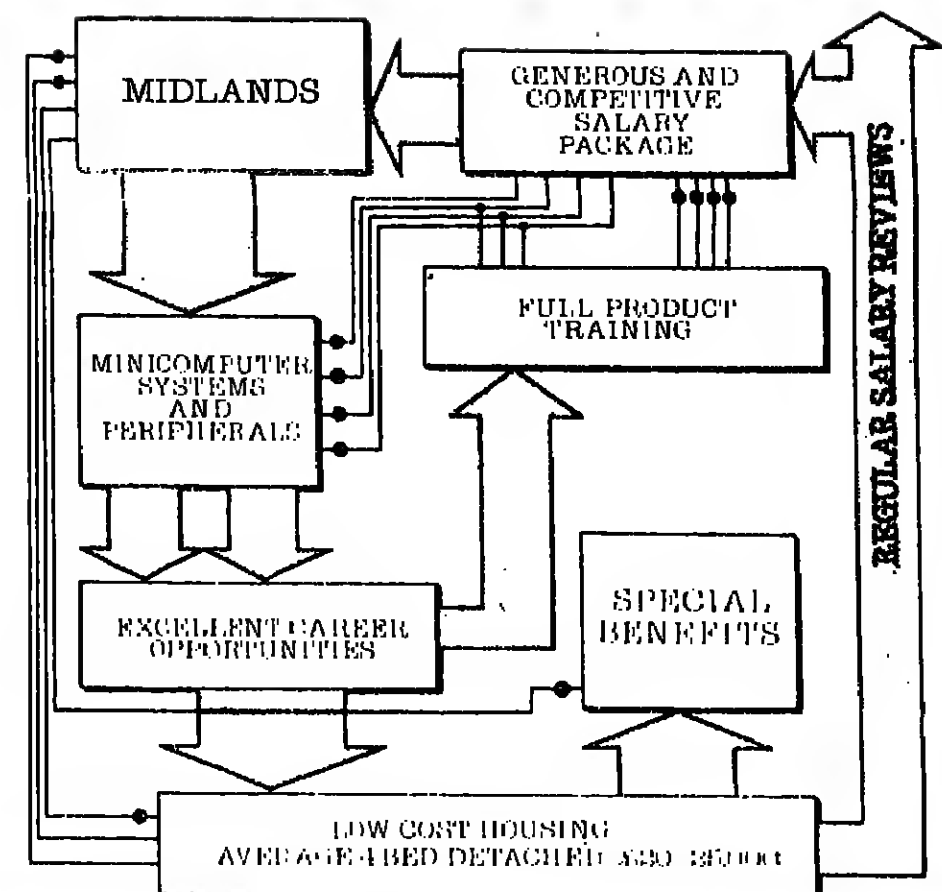
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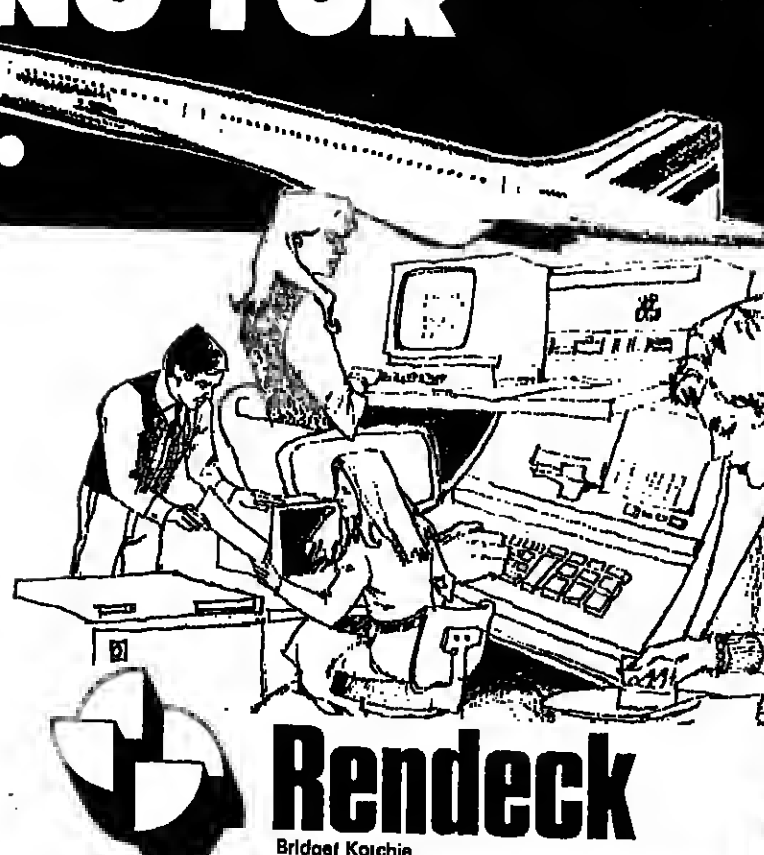
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Application: Applications should be sent to the Institute of Physics, 21, Bedford Square, London WC1N 3AS.

Closing Date: 28 February 1979.

Interview: Interviews will be held on 1 March 1979.

Further Information: Further information can be obtained from the Institute of Physics.

Address: Institute of Physics, 21, Bedford Square, London WC1N 3AS.

Telephone: 01-637 9611.

Postcode: WC1N 3AS.

Website: www.instituteofphysics.org.uk

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At this stage we are probably interested in applicants with two or more years experience but there will be some appointments for staff with less experience later in the year.

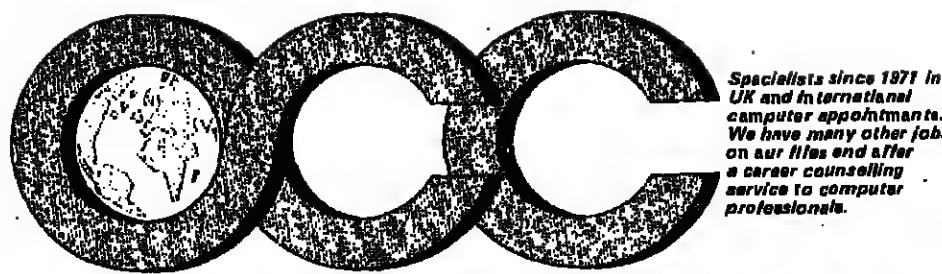
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Computer Analysts and Programmers was established in 1962 and has been profitable in each of the sixteen years of its operation. The Group now employs over 800 professional staff. All staff take part in our well established career development programme and project performances are carefully monitored to ensure that individual skills and aptitudes are taken into consideration on future projects. Benefits include at least 4 weeks holiday, a generous sick pay scheme, group sickness insurance, staff mortgage scheme, a share purchase scheme and regular salary and promotion reviews. Super staff are eligible for our annual bonus scheme. Removal assistance is available where appropriate. Local interviews will be arranged where applicable, if you would like to apply please write or telephone, quoting reference number CW1176, to:

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NELP

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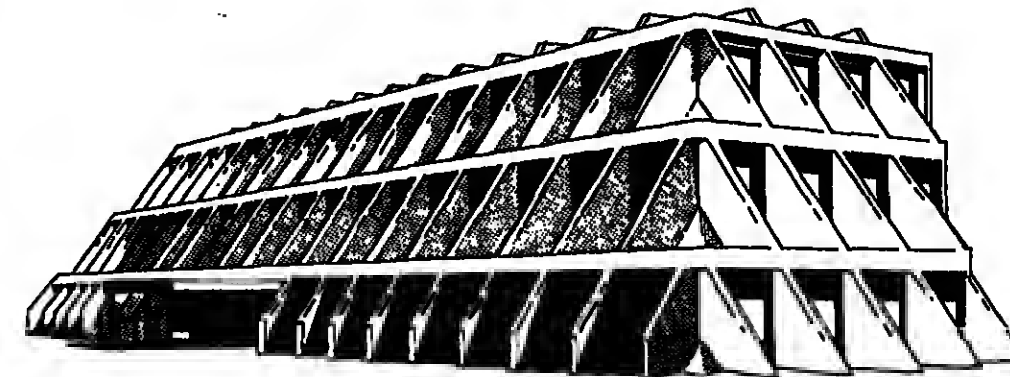
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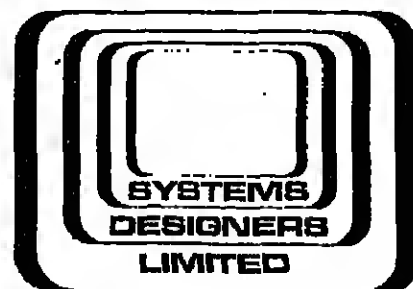
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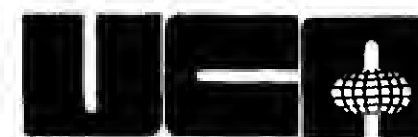
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Candidates should have at least six years experience of systems software, preferably in an IBM environment, with a successful record as a project manager leading a team implementing OS, TSO, MVS, IMS or other standard software. The job demands a person with excellent man management ability, a high degree of technical expertise and the potential for advancement to senior management.

This is an above average opportunity, with a salary negotiable according to experience and normal large company benefits for this management position. Assistance will be given for relocation.

For an informal discussion, please contact Jim Baker.

JAMES BAKER ASSOCIATES
International Personnel Consultants
16 Maddox Street, London W1
Tel: 01-491 4478

ICCH OPERATIONS

Our client, ICCH, provides a unique operational service both to the Commodity Markets in London and overseas and to individual brokers. Business performed by brokers has to be completed with the utmost speed and accuracy, factors which demand the use of advanced computer technology. Their substantial investment in hardware consists of twin IBM 370 mainframes (currently 370/138, 370/148) operating under DOS/V5 supporting an extensive teleprocessing network. ICCH must provide their clients with an efficient service particularly in respect of hardware and operational procedures. Because high standards are essential extensive training is given. Opportunities now exist for:

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We are looking for Operations staff with at least 1 year's IBM 370 experience who are looking to diversify their talents into an area responsible for the smooth running of all hardware both internally and on client premises. Personality and initiative are vital as the job involves extensive user contact and the ability to keep abreast of the latest technological developments relating to mainframes and communications equipment. An extremely social shift rota covers 9 a.m.-4 p.m., noon-8 p.m. Mon-Fri.

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The company is located in modern offices in the CITY of LONDON. Fringe benefits are excellent and include NDC CONTRIBUTORY PENSION, INTEREST-FREE SEASON TICKET LOANS, ACTIVE SPORTS & SOCIAL CLUB, LVs, CHEAP PERSONAL LOANS, 4 WEEKS' HOLIDAY and PAID OVERTIME.

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Although initially this position is for a technician there is potential for a management appointment in the near future. Salary according to experience. Large company benefits.

Contact: Jim Baker.

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DAI

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£6-8000 pa

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Applicants should have a sound COBOL background together with a knowledge of IBM operating systems. For the systems analyst position IMS experience would be a distinct advantage.

In addition to attractive salaries the benefits include £1 per day, LVs, pension scheme, interest free season ticket loans and relocation expenses where appropriate. Please phone Brian McIntosh on 01-408 1655 or send brief details to Employee Relations Department, Amoco Europe, 33 Cavendish Square, London W1.



Road Transport Industry Training Board

Senior Computer Programmer

Wembley

Salary £6,120 per annum

Applications are invited for the post of Senior Computer Programmer in the Management Services Division of the Road Transport Industry Training Board at Wembley. Applicants must be proficient in the use of COBOL and experience with Honeywell OS/2200 is desirable. At least three years' experience in a commercial environment is required.

In addition to the H-2030 mainframe (using discs and tapes) the department operates a Data General Nova 3 linked to 'Onyx' direct input devices, and knowledge of assembler language techniques will be an advantage.

The successful applicant will work with a small team reporting to the Chief Programmer. He or she will be expected to assist and advise Junior Trainee staff.

Salary £6,120 per annum including London Weighting Allowance. Conditions of service include 20 working days' holiday, contributory pension scheme and life insurance.

Please write giving full career and personal details and enclosing CV to Personnel Department, Road Transport Industry Training Board, Capital House, Empire Way, Wembley, Middlesex. Tel: 01-902 8880

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The project life will be between 18 months and 2 years (when successfully achieved could mean further work inside the company or transfer to other work outside). As well as a starting salary of £5,500 we offer BUPA membership, bonus scheme, tuition fees, a pension, excellent contributory pension scheme and considerable working conditions.

Please write with c.v. to: David Whitaker, J. Whitaker & Sons Ltd., 18 Dymock Street, London, WC1A 1DP

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Vacancies exist at Deputy and Assistant levels. Candidates for both posts must have a good Honours Degree, preferably in statistics and computing, although candidates with good Honours degrees in other subjects may be considered.

At Deputy level applicants must have a minimum of 4 years' relevant postgraduate experience. It would be an advantage if this experience included some of the following: use of statistical packages, Fortran programming, on-line computing, data base management.

The Commissioners may decide to interview only those applicants who appear from the information available to be best qualified.

Salary Scales:
Deputy £5,701-£7,552
Assistant £3,113-£4,642 (plus an allowance of £412 per annum after 2 years' satisfactory service within the maximum of the scale).

Grading and starting salary will be related to qualifications and experience.

Please write or telephone for an application form quoting job reference S6 115/79/CW to the Civil Service Commission, Rosepark House, Upper Newtownards Road, Belfast BT4 3NR (telephone Dundonald 4885 ext. 258). Completed forms must be returned to arrive not later than 1 March, 1979.



Systems Programmers — all levels

In order to develop our next generation of micro-computer based terminals we need innovative Programmers who are looking for an opportunity of applying their abilities to the design and development of complete systems.

These abilities should include the capability of taking a product from initial concept through design and development into production.

Specifically, you will be involved on all of the following:

- * Operating Systems
- * Interpreters
- * User Interfaces
- * Maintenance and Diagnostic Routines

Previous experience in any of the above would be useful but not essential, enthusiasm, being the most important factor.

We are looking for Systems Programmers at all levels, from recent graduates to those with many years of experience who are looking for a new challenge.

Initially you will be based at Croydon although some travel will be necessary in order to fulfill your job responsibilities. Long term career opportunities exist both in the UK and overseas.

The compensation package will reflect the importance placed on these positions. Salary, in particular, will not inhibit selection of right persons.

Please write or call, Cliff Marks

Personnel Manager

Burroughs Machines Ltd.

512 Purley Way

Croydon, Surrey CR0 4NZ

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Colt Electronics Limited invite applications by the team of field service engineers to maintain, service, the rapidly expanding customer base of modems, multiplexors, and intelligent network processors.

A vacancy exists in the Basingstoke area for an applicant with experience of servicing in one or more of the following fields: Computers, computer peripheral equipment, data communications, digital transmission equipment. Qualifications required are HNC or C & G Final Standard.

Generous salary with overtime, subsistence allowance and company car are offered, together with benefits including BUPA, non-contributory pension scheme and life assurance.

Please write or telephone Mrs. Deborah Ashby an application form.

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MANAGEMENT & EXECUTIVE SELECTION

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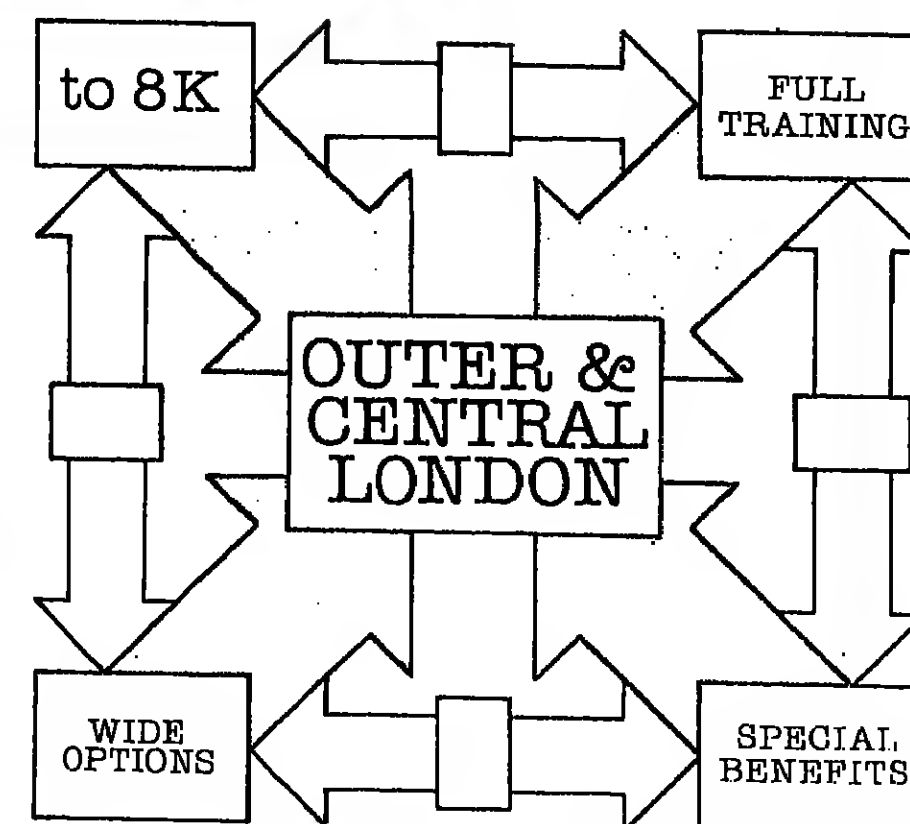
QUALIFICATIONS: A minimum of an HNC (Electronics) or equivalent plus one year's experience of computer maintenance - but the more experience you have, the more senior the role offered.

BENEFITS & PACKAGE: Medical, Pension, and many other excellent schemes, as befitting a company of this stature. The package quoted excludes payments for overtime, standby, shift, call out etc., but includes Central London Allowance of £2000. Outer London positions provide company car and London Weighting Allowance.

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P.S. Opportunities also exist elsewhere in the U.K.!

Style 201/41, Albany House, 384 Regent Street, London W1B 5AA 01 637 9611 **MANAGEMENT & EXECUTIVE SELECTION**



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CONTRACT WORK CENTRAL LONDON

8FC minimum in either MATHS, COMPUTER SCIENCE or ENGINEERING SCIENCE. Applicants must have at least 1 (one) year minimum experience of FORTRAN 4 and experience of COBOL or basic languages. Rates to £4.20 per hour P.A.Y.E during the week midweek overtime paid at £5.80ph weekend at £6.30 & £8.40 P.A.Y.E. The minimum age for these contracts is 22 years old. Immediate starts are available.

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For further details of the above and other vacancies available please contact:
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Kewley Technical Services (Southern) Ltd
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London SW1H 9EZ or phone 01-222 3534
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Sales Manager

London

£10-12,000 + car

Collect Data Systems design and manufacture computer-based typesetting equipment for the printing industry. It is about to build up its own sales force to replace its existing agents. The Sales Manager would be expected to achieve this.

The Sales Manager is a senior appointment in a small company and is expected to contribute to the management and policy making of the business, and to take responsibility for marketing and commercial aspects of the sales function. The job is primarily to sell computer-based systems to publishers and printers and the manager is expected to carry out sales visits personally. He/she must have a record of achievement in technical sales and, ideally, should have an

understanding of modern mini computers and of the print industry. Base location is close to the City of London. Prospects are excellent, dependent primarily on the results achieved by the individual. Direct bonus is therefore not considered appropriate. Initial salary and conditions of work are fully negotiable but are expected to include a £10-12,000 salary and a car.

PA Personnel Services Ref: SM9/17/78/CW Initial interviews are conducted by PA Consultants. No details are divulged to clients without prior permission. Please send brief career details or write for an application form, quoting the reference number on both your letter and envelope, and advise us if you have recently made any other applications to PA Personnel Services.

PA Personnel Services

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For the software portion of a major production contract for the Royal Navy.

Smiths Industries Limited (Aviation Division) have a vacancy for a software project engineer qualified to design level in electrical/electronic engineering, mathematics or computing science.

The successful candidate must have had several years' experience in the design and development of time software, particularly for military applications using a high level language, a G COAT 66. Knowledge of navigation and navigation aids would be particularly useful.

Previous experience of the management of a team is desirable, while the ability to lead a project from inception to production is considered essential.

This important aspect of the job is to liaise with the customer and with subsidiary companies within Smiths Industries Limited.

Please write for application form to:

H. Upson

SMITHS INDUSTRIES LIMITED

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Tel: Blunham Close 3333 Ext. 2388

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The Sales quota is £250K, which with Systems priced between £30K and £130K should not prove difficult to achieve. Earnings potential is therefore extremely high.

A company car is naturally provided and the successful candidate can look forward to a career leading to sales management. The chance to own a stake in the company is also on offer.

Contact: Andy Wright

Systems Consultants

London

neg. to £9,500 + benefits

Several major development projects involving databases and teleprocessing networks are currently being developed by some of the most prestigious international organisations based in the UK. We therefore have several vacancies being notified to us and would like to hear from Analysts who possess a sound, broad commercial or business applications systems background on any type of machine.

Candidates should have already progressed through the usual channels (i.e. programming and low-level design) to their current positions and be looking for the opportunity to further broaden their experience, perhaps into areas of technology hitherto outside their scope.

Salaries at this level range from £7.5 to £10K and are generally negotiable according to ability.

Contact: Margaret Stevens

BELGIUM

Technical Authors (Software)

o. £15,000

Our client has vacancies for up to eight Technical Authors with at least 2 years experience of software product documentation, ideally non-commercial. Programmers with a flair for writing will also be considered, providing they can demonstrate a keen interest in this type of work - maybe as a career. Some of the positions are relatively short term so that Authors not requiring a long period away from home could be interested.

Contact: Mike Creamer

For further information on any of the above vacancies please contact the appropriate consultant. If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

JAMES BAKER ASSOCIATES, International Personnel Consultants
18 Maddox Street, London W1. Tel: 01-481 4478

(Junior) Systems Programmer

Surrey

up to £7,800

This organisation now have their IBM 3032 installed and running under VS1 with plans to introduce MVS within one year. This presents an ideal opportunity for a systems programmer, with around two years good IBM experience, to move into the latest range of equipment and obtain valuable further training. Applicants should be familiar with performance orientated products and have a good understanding of SYSGEN and operating systems. The successful candidate will enjoy an environment of self-defined job responsibility and every encouragement to progress in their career.

Convenient location. Realistic salary, and excellent fringe benefits. Contact: Mike Creamer

Analyst Programmer

Hampshire.

c. £7,000

Our client, a systems house specialising in insurance applications, wishes to recruit an Analyst Programmer to work on the development of both packages and systems for the insurance market.

Applicants should have at least two years as a programmer in an insurance environment with experience of COBOL (or RPG2). A background of mini-computers would be an advantage.

This is a real opportunity to work in a small group with professionals and have the chance to travel.

Contact: Jim Baker

Engineers - Field Support

All Areas

to £8,000 + car & benefits

A number of clients, principally manufacturers or suppliers of micro, mini or terminal systems are seeking experienced engineers for first line support. Generally, the work involves dealing with a variety of problems associated with hardware and diagnostic software, candidates will be expected to have the experience to solve any client problems. Applicants should have a minimum of one year's experience in a field engineering environment and have at least ONC in electronics. Most companies provide intensive training and follow this up with interesting and demanding field work.

Excellent remuneration packages (c. £8,000), career prospects and work involvement.

Contact: Margaret Stevens

THE OPEN UNIVERSITY STUDENT COMPUTING SERVICE COMPUTER OPERATOR

Applications are invited for the above post at The Open University Computer Centre, The Regent Centre, Gosforth. The Student Computing Service maintains a large national time-sharing network using Hewlett Packard 2000 and DEC-20 computer systems which provide a practical computing service to 30,000 students via remote terminals. Previous experience with time-sharing computer systems would be an advantage.

We would also be interested in applications from young persons who wish to commence a career in computer operations.

Salary, according to age and experience, will be within the range £2,878-£3,084 (under review). Two shift working will be required for which an allowance of £345 p.a. will be paid.

Application forms and further particulars are available from The Recruitment Office, (JD828/1), The Open University, P.O. Box 75, Walton Hall, Milton Keynes MK7 9AL, or telephone Milton Keynes 83404, there is a 24-hour answering service on 638888. Closing date for applications: 1st March.

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To join a carefully selected group of hardware and software engineers with an outstanding reputation for applying a wide range of microprocessors in such fields as:

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We can give you the responsibility for taking software systems all the way from initial discussions to final production on behalf of clients ranging from one-man businesses to multinational agencies.

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We can offer an excellent salary and fringe benefits in pleasant working conditions in brand new purpose-built premises.

Please apply to:

Janet Hales, Personnel Officer

Cambridge Consultants Limited

Science Park, Milton Road

Cambridge, Tel: Cambridge 58855

FINANCE DEPARTMENT

COMPUTER PROGRAMMER

Post No. FCB

Salary Grade AP4/E - £3833-£4781 + £212

ment.

Commencing salary within the Career Grade will be dependent on qualifications and experience.

Applicants must have at least two years experience in the design and development of software systems for the finance and accounting departments of a large company. The successful applicant will be responsible for the design, writing and maintaining of programs for the finance department (some of which are On-Line), working as a member of a team.

The Council are currently enhancing the financial management system to facilitate the development of communication systems.

Application forms available from the Personnel Officer, Chief Personnel Officer, City of Wigan, Tel: Wigan 44991 Ext. 200.

Closing date: March 2nd, 1979.

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Fast-up with shift working and you enjoy dealing with people? Then if you have T/P experience on (possibly) IBM machine, apply now. This with-it firm offers top grade perks plus full training facilities. CW 7/8

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£4,500 to £5,100 inc. NR. FELTHAM
Would you like to work on the latest IBM 3030 machines? If you have good MVS experience and know JCL well, then this top grade Manufacturer and Service Bureau would like to see you. Top-top perks and paid overtime. CW 7/9.

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OPERATOR

£4,400 inc. W1
Now is the chance to extend your nine months' minimum experience of IBM DOS/VS systems. Apply now and join the queue for this excellent vacancy. Only 2 shifts. CW 7/11

DEC OPERATORS

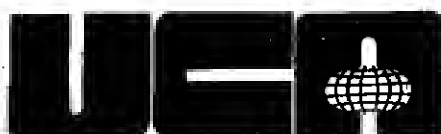
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Unusual opportunity in gain experience of microcomputer systems. The above position is for two years starting as soon as possible to develop an in-house CAD system for textile design. The position involves multiple microcomputers and a range of CAD orientated peripherals (digitiser, colour monitor, etc.). Languages predominantly high level with assembler as necessary. The appointment will be made according to age, qualifications and experience on the programme scale up to £4,631 per annum.

METROPOLITAN BOROUGH OF KNOWSLEY Borough Treasurer's Department COMPUTER AUDITOR

PO111-51-£5415 (£6030 plus £112)
The successful applicant will be required to undertake reviews and reports on existing and proposed D.P. Systems. This includes liaison with both the User Section and Computer Staff prior to the implementation of all new financial programmes to ensure efficiency can be incorporated. You should have experience in computer programming and/or systems analysis. An Accounting Qualification would be an advantage. 35-hour week. Local holiday entitlements. 100% removal expenses in appropriate cases. Job Details and Application Forms available from the Personnel Officer, Municipal Buildings, 125 Liverpool Road, L32 1TX (051-548 8655). Closing date: 2nd March, 1979.

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An increasing number of large, exciting projects involving computer control has provided this outstanding opportunity for a knowledgeable engineer to undertake the commissioning and servicing of sizeable computer installations abroad and in the U.K. We are a growing company and can offer rapid career advancement to the right candidate.

A background in digital computers, combined with a real interest in hardware is essential. Experience in DEC or OEC processors would be useful, although specialist training will be given. Candidates must additionally demonstrate the ability to communicate well with the customer.

Where overseas travel is required, generous allowances will be paid.

Apply in writing or telephone:
SERVOTEST LIMITED
Service Road
Greenford
Midx. UB6 7AA
01-898 1852 (Mr. T. Mott)



LEICESTER UNIVERSITY

The University of Leicester requires two programmers to work in its Administrative Computer Section. Both posts offer an excellent opportunity to make a significant contribution to the development of new computerised procedures for the principal areas of the University's administration, including finance and academic records.

PROGRAMMER

Salary up to £6,555 p.a.

Applicants for the post should have about 2 years' programming experience. The above have a computer in use 24/74 (MIDP 11). Vacancies exist in VDU's in user departments and therefore familiarity with Real-Time systems would be an advantage, though not essential.

JUNIOR PROGRAMMER

Salary up to £5,604 p.a.

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For detailed information about the above vacancies and an application form, please write to the Registrar, University of Leicester, Leicester LE1 7RH. Informal enquiries may be directed to Roy Bent on (0533) 60000 Ext. 348. Completed applications should be returned as soon as possible and not later than 26 March, 1979.

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Vacancies exist for experienced DP programmers (both male and female) in the Central Management Service, Department of H.E. The department is located at Wilton, a pleasant part of the University campus.

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For an application form please write to: Mr. S. Kemp, Senior Personnel Officer, ICI Head Office Services Dept, P.O. Box 3, Fulshaw Hall, Wilmslow, Cheshire SK9 1QB.



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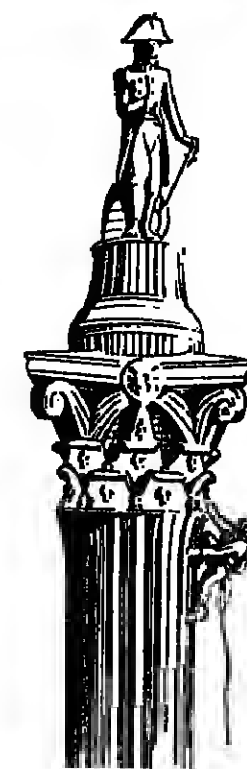
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Computing Staff

LONDON SE1

The Central Electricity Generating Board, South Eastern Division, is seeking a Senior Programmer and Programmer to work in the Computing Branch. The Senior Programmer will be responsible for the design and development of computer programs for the Board's power plant and related systems. The Programmer will be responsible for the coding and testing of these programs. Both positions require a degree in Computer Science or a related field, and several years' experience in the field. Applications should be sent to the Personnel Officer, Computing Branch, Central Electricity Generating Board, South Eastern Division, 100 Victoria Street, London SE1 1JL.

SENIOR PROGRAMMER

A deep knowledge of COBOL is essential and familiarity with another language is desirable. Applicants should possess degree level qualifications in a relevant subject. The successful applicant will be required to assist in the training of junior members of the team, maintain the Branch's standard of work and take responsibility for the successful implementation of development projects.

Salary within a scale rising from £6055 to £7780 per annum. Vacancy No: 1023/79/CW

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Salary within a scale rising from £4750 to £6735 per annum. Vacancy No: 1024/79/CW

Applicants should send their curriculum vitae, with a recent photograph, to the Personnel Officer (Computing), Central Electricity Generating Board, 100 Victoria Street, London SE1 1JL, by 26 February 1979 on telephone: 01-439 6481.

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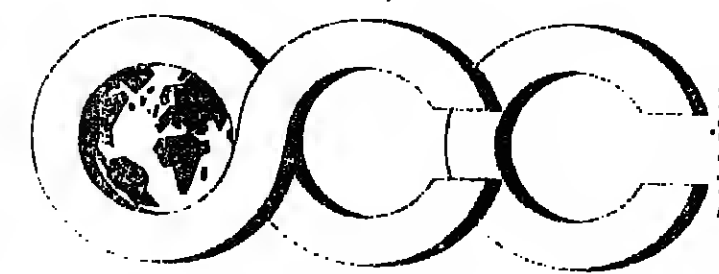
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